Wireless LAN Mobility System

Wireless LAN Switch Manager User's Guide

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About This Guide

This manual shows you how to plan, configure, deploy, and manage a Mobility System wireless LAN (WLAN) using the 3Com Wireless LAN Switch Manager (3WXM) tool suite.

Read this manual if you are a network administrator or a person responsible for managing a WLAN.

If release notes are shipped with your product and the information there differs from the information in this guide, follow the instructions in the release notes.

Most user guides and release notes are available in Adobe Acrobat Reader Portable Document Format (PDF) or HTML on the 3Com World Wide Web site:

http://www.3com.com/

Conventions

Table 1 and Table 2 list conventions that are used throughout this guide.

Table 1 Notice Icons

Icon	Notice Type	Description
	Information note	Information that describes important features or instructions
	Caution	Information that alerts you to potential loss of data or potential damage to an application, system, or device

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This manual uses the following text and syntax conventions:

Table 2 Text Conventions

Convention	Description
Menu Name > Command	Indicates a menu item that you select. For example, **File > New** indicates that you select **New** from the File menu.
`Monospace text`	Sets off command syntax or sample commands and system responses.
Bold text	Highlights commands that you enter or items you select.
Italic text	Designates command variables that you replace with appropriate values, or highlights publication titles or words requiring special emphasis.
[ ] (square brackets)	Enclose optional parameters in command syntax.
{ } (curly brackets)	Enclose mandatory parameters in command syntax.
| (vertical bar)	Separates mutually exclusive options in command syntax.
Keyboard key names	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press Ctrl+Alt+Del
Words in *italics*	Italics are used to: ▪ Emphasize a point. ▪ Denote a new term at the place where it is defined in the text. ▪ Highlight an example string, such as a username or SSID.

Documentation

The 3WXM documentation set includes the following documents.

- *Wireless LAN Switch Manager (3WXM) Release Notes*

  These notes provide information about the 3WXM software release, including new features and bug fixes.

- *Wireless LAN Switch and Controller Release Notes*

  These notes provide information about the MSS software release, including new features and bug fixes.

- *Wireless LAN Switch and Controller Quick Start Guide*

  This guide provides instructions for performing basic setup of secure (802.1X) and guest (WebAAA™) access, for configuring a Mobility Domain for roaming, and for accessing a sample network plan in 3WXM for advanced configuration and management.

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- *Wireless LAN Switch Manager Reference Manual*

  This manual shows you how to plan, configure, deploy, and manage a Mobility System wireless LAN (WLAN) using the 3Com Wireless LAN Switch Manager (3WXM).

- *Wireless LAN Switch Manager User's Guide (this document)*

  This guide shows you how to plan, configure, deploy, and manage a Mobility System wireless LAN (WLAN) using the 3Com Wireless LAN Switch Manager (3WXM). It contains information about recommended system requirements you should meet for optimum 3WXM performance, installing 3WXM client and 3WXM Services software, and an introduction to using the 3WXM interface.

- *Wireless LAN Switch and Controller Hardware Installation Guide*

  This guide provides instructions and specifications for installing a WX wireless switch in a Mobility System WLAN.

- *Wireless LAN Switch and Controller Configuration Guide*

  This guide provides instructions for configuring and managing the system through the Mobility System Software (MSS) CLI.

- *Wireless LAN Switch and Controller Command Reference*

  This reference provides syntax information for all MSS commands supported on WX switches.

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- *Document title*
- *Document part number and revision (on the title page)*
- *Page number (if appropriate)*

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Example:

- *Wireless LAN Switch and Controller Configuration Guide*
- *Part number 730-9502-0071, Revision B*
- *Page 25*

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1 GETTING STARTED

This chapter contains information about recommended system requirements you should meet for optimum 3WXM performance, installing 3WXM client and 3WXM Services software, and an introduction to using the 3WXM interface.

Hardware Requirements for 3WXM Client

Table 3 shows the minimum and recommended requirements to run the 3WXM client on Windows and Linux platforms.

Table 3 Hardware Requirements for Running 3WXM Client on Windows and Linux

	Minimum	Recommended
Processor	Intel Pentium 4, 2 GHz or equivalent	Intel Pentium 4, 3 GHz or equivalent
RAM	512 MB	1 GB
Hard drive space available	100 MB	200 MB
Monitor resolution	1024x768 pixels, 24-bit color	1600x1200 pixels, 32-bit color
CD-ROM drive	CD-ROM or equivalent	CD-ROM

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Hardware Requirements for 3WXM Services

Table 4 shows the minimum and recommended requirements to run the 3WXM Services on Windows and Linux platforms.

Table 4 Hardware Requirements for Running 3WXM Services on Windows and Linux

	Minimum	Recommended
Processor	Intel Pentium 4, 2.4 GHz or equivalent	Intel Pentium 4, 3.6 GHz or equivalent
RAM	1 GB	2 GB
Hard drive space available	1 GB	2 GB
Monitor resolution	1024x768 pixels, 24-bit color	1600x1200 pixels, 32-bit color
CD-ROM drive	CD-ROM or equivalent	CD-ROM

Software Requirements

3WXM client and 3WXM Services are each supported on the following operating systems:

- Microsoft Windows Server 2003
- Microsoft Windows XP with Service Pack 1 or higher
- Microsoft Windows 2000 with Service Pack 4
- SUSE Linux 9.1 and Red Hat WS 3

You must use the English version of the operating system you select. Operating system versions in other languages are not supported with 3WXM.

The following additional software is required for certain 3WXM features:

- Web browser (for example, Microsoft Internet Explorer 5.*x* or 6.*x* or Netscape Navigator 6.*x* or 7.*x*)—For displaying 3WXM online help, work orders, and reports
- Adobe Acrobat Reader 5.x or later (or plug-in)—For reading the manuals and release notes
- HP OpenView Network Node Manager 6.4 or later—Must be installed prior to 3WXM if you plan to use 3WXM in your HP OpenView environment

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Preparing for Installation

A licensed copy of 3WXM comes with a base license key. Before you install 3WXM, make sure you have the appropriate administrative privileges on the system.

After you have installed 3WXM, you will need to register your license and the serial number with 3Com in order to obtain an activation key.

The base key along with its activation key enables you to manage up to 10 wireless LAN switches. To manage more than 10 wireless LAN switches, you also need an upgrade key and an additional activation key, which you obtain from 3Com. See "Serial Number and License Key" below for more information.

User Privileges

Before you install 3WXM, make sure that you are logged in as a user who has permission to install software, or as an administrator.

After you install 3WXM, you can configure 3WXM access privileges for the user accounts on the machine. Likewise, you can configure access privileges for the monitoring service, if installed. Access privileges for the 3WXM client are completely independent of access privileges for the monitoring service, and are configured separately.

Serial Number and License Key

3WXM comes with a base license key, which is provided on the CD cover. To use 3WXM Services, you need to enter the base key and an activation key, which you obtain from 3Com. The base key and activation key enable you to manage up to 10 wireless LAN switches. To manage more than 10 wireless LAN switches, you also need an upgrade key and additional activation key, which you obtain from 3Com.

Each time you connect the 3WXM client to the 3WXM Services, it checks the license information. If the product is not licensed, the License wizard is displayed.

If you do not have a license key, you can run 3WXM for 30 days. Once this trial period is over, you will need to purchase a license to continue running the 3WXM software.

HP OpenView Network Node Manager

If you want to integrate 3WXM into your HP OpenView environment, you have the option of installing the HP OpenView plug-in required to use Network Node Manager with 3Com products. Make sure that HP OpenView is already installed before installing 3WXM with the plug-in.

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Resource Allocation

Table 5 contains general recommended guidelines for hardware requirements and memory allocation based on the number of radios and WX switches your server will support. A larger number of WX switches implies more connections and data processing, and consequently, more CPU is required. A larger number of radios implies more data (including client sessions) which requires more RAM and storage.

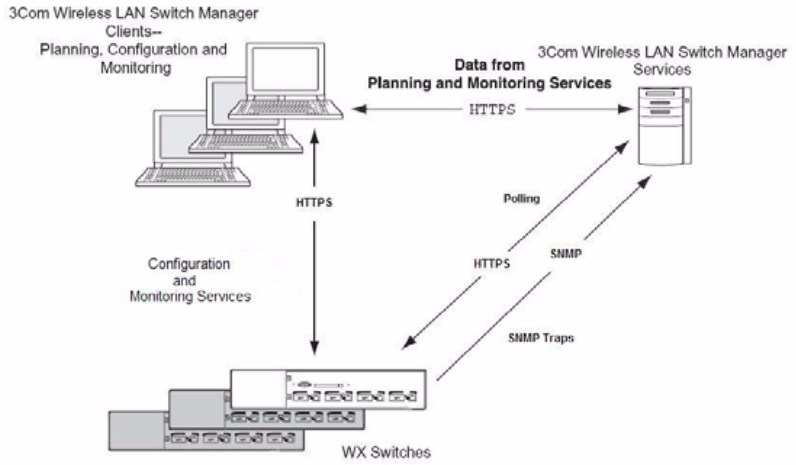
Table 5 Recommended Server Hardware Allocation

Number of Radios	1-25 WX Switches	25-50 WX Switches	50+ WX Switches
1 – 1000	▪ 2.4 GHz P4 ▪ 500 MB RAM ▪ 1 GB HD	▪ 2.8 GHz P4 ▪ 500 MB RAM ▪ 1 GB HD	▪ 3.2 GHz Xeon ▪ 1 GB RAM ▪ 1 GB HD
1000 – 2000	▪ 2.4 GHz P4 ▪ 1 GB RAM ▪ 2 GB HD	▪ 3.0 GHz P4 ▪ 1 GB RAM ▪ 2 GB HD	▪ 3.6 GHz Xeon ▪ 2 GB RAM ▪ 2 GB HD

3WXM Services Options

3WXM Services can be installed either in standalone mode or shared mode. Standalone mode is when 3WXM client and 3WXM Services are installed on one machine. Standalone mode is primarily used for trying out 3WXM, while shared mode is used in a working environment. In shared mode, the administrator sets up 3WXM Services on a single host (typically with more resources) and other hosts with the client 3WXM application share 3WXM Services to access network plans and monitoring information. See Figure 1.

Figure 1 3WXM Services in Shared Mode



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Installing 3WXM

To install the 3Com Wireless Switch Manager, follow the instructions below for your operating system.

Installing 3WXM on Windows Systems

To install 3WXM on a Windows system:

The 3WXM install program installs either just the 3WXM client, or both the 3WXM client and Services. There is no option to install the 3WXM Services only.

1 Insert the 3WXM CD in the CD-ROM drive.

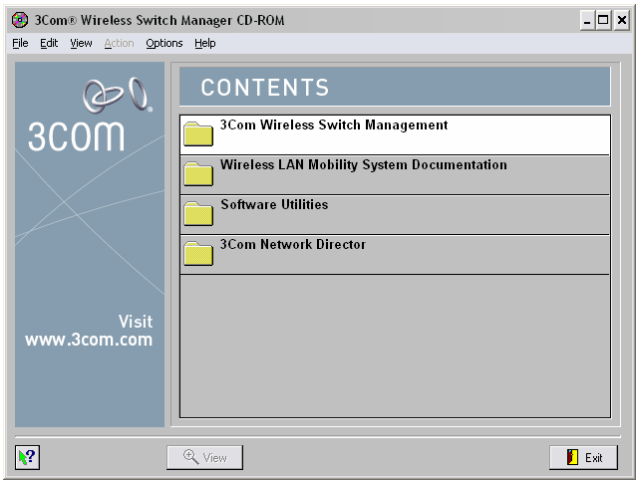
If Autorun is enabled, wait briefly for the install program to start.

If Autorun is disabled, follow these steps:

a In Windows Explorer, navigate to your CD-ROM drive.

b In the Software\3WXM directory, double-click **install.exe**.

The Introduction page of the 3Com Wireless Switch Manager installation wizard appears, and then the Contents screen appears, as shown in the following figure.



2 Open the **3Com Wireless Switch Management** folder.

3 Select **3Com Wireless Switch Manager**.

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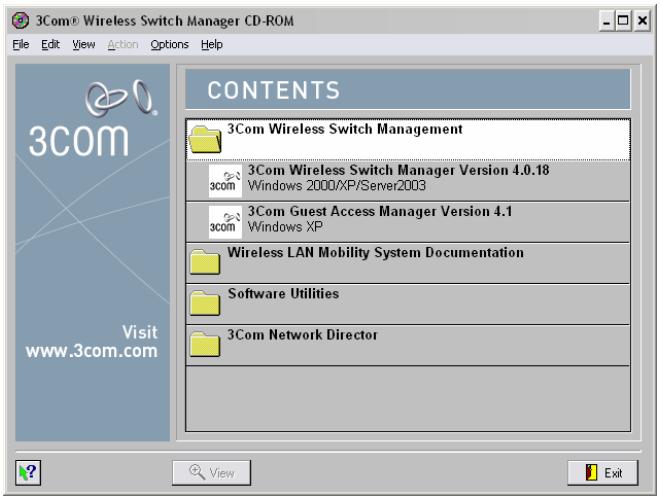

4 Click the **View** button.

The 3Com Wireless LAN Switch Manager (3WXM) information screen appears.

5 Click the **Install** button.

The installation begins. During the installation, the 3Com Wireless Switch Manager installation wizard minimizes.

6 When the installation is complete, maximize the 3Com Wireless Switch Manager installation wizard screen, and then press the **Contents** button.

7 Press the **Exit** button to close the wizard, or navigate to the other items on the CD.

Installing 3WXM on Linux Systems

The same 3WXM install program installs either 3WXM client, 3WXM Services, or both.

To install 3WXM on a Linux system:

- Unpack files
- Use the Installation Wizard

Unpacking Files

To unpack files on Linux systems:

1 Log in as superuser.

2 Insert the 3WXM CD in the CD-ROM drive.

3 For the platform on which you are installing 3WXM, click the appropriate **Installer** link.

4 Save the installation binary to a directory.

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5 Open a shell window.

6 Use the **cd** command to go to the directory in which you saved the installation binary.

7 In the shell window, type **sh ./install.bin**. The Introduction page of the 3WXM installation wizard appears.

8 Click **Next** to display the Choose Installation Type page of the installation wizard, and go to "Using the Installation Wizard".

The installer does not make any path changes during installation. You might want to configure path information, to make 3WXM easy to start on your system. 3WXM must be run at the root level.

Using the Installation Wizard

To use the installation wizard on a Linux system:

1 On the Choose Installation Type page, choose one of the following:

- To install both the 3WXM server and the client, click the 3WXM Services icon.
- To install only the 3WXM client, click the 3WXM client icon.

For detailed installation instructions, see "Installing 3WXM" in the Wireless LAN Switch Manager Reference Manual.

Near the end of the installation process, the installer displays the service ports 3WXM Services will use:

- 443—HTTPS server port
- 162—SNMP trap receiver port

You can change one or both port numbers to prevent conflicts with other applications on the same host.

Multiple applications cannot use the same UDP or TCP port on the same host. For example, port 443 is defined by the Internet Assigned Numbers Authority (IANA) as the well-known HTTPS port. If the host on which you install 3WXM Services uses its default HTTPS port (443), and the same host also runs Microsoft Internet Information Services (IIS) on its default HTTPS port (443), there will be a conflict over the port. 3WXM clients will not be able to communicate with 3WXM Services.

If you plan to use the remote configuration option to configure new switches, you must use port 443 for 3WXM Services. When a switch requests its configuration from 3WXM Services, it sends the request to port 443.

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Start 3WXM Services

3WXM Services are automatically started when you install them on a Windows system.

To start the 3WXM Services on a Unix or Linux System:

To start 3WXM Services manually, type a command such as the following:

```
solaris# rm-services start
```

To stop 3WXM Services manually, type a command such as the following:

```
solaris# rm-services stop
```

These examples assume that 3WXM Services is installed in the default location.

Connect 3WXM Clients to 3WXM Services

To connect the client to Services:

1. Select **Start > Programs > 3Com > 3WXM > 3WXM**. The 3WXM Services Connection wizard is displayed.
2. Enter the IP address or fully-qualified hostname of the machine on which the service is installed.

   If 3WXM Services is installed on the same machine as the one you are using to run 3WXM client, enter 127.0.0.1 as the IP address. This is a standard IP loopback address.
3. Specify the service port, if different from the port number in the Service Port listbox.

The port number used by the monitoring service must not be used by another application on the machine where the monitoring service is installed. If the port number is used by another application, change the port number on the monitoring service. (See "Configure 3WXM Services".)

4. Click **Next** to connect to the server.
5. If the Certificate Check dialog is displayed, click **Accept**.

   If you left the Open Network Plan option on the 3WXM Services Connection dialog selected, the server opens the last network plan.

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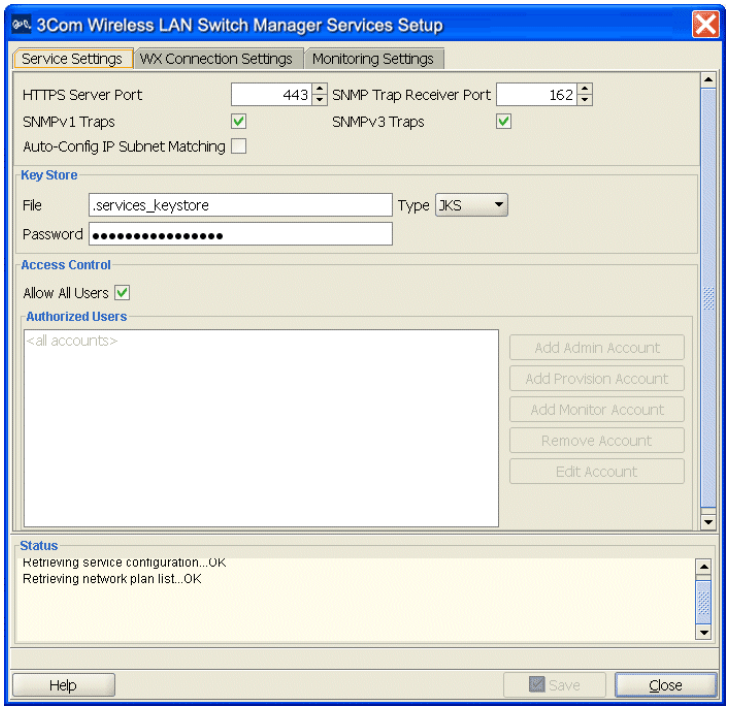
Configure 3WXM Services

You can change the properties of 3WXM Services.

If a firewall is enabled on the host where you install 3WXM Services, 3WXM Services will not be able to communicate with 3WXM client or with WX switches unless the firewall is configured to allow through traffic for the SSL and SNMP ports (443 and 162 by default).

To configure 3WXM Services:

1 Select **Tools** > **3WXM Services Setup** dialog box from the 3WXM main tool bar. The 3WXM Services Setup wizard is displayed.



By default, a username and password are not required to access 3WXM Services from 3WXM client. You can configure user accounts for administrative, provisioning, and monitoring access. (See "3WXM Access Control" on page 23.)

2 You can optionally configure the following:

- Select the arrow buttons to change the HTTPS Server Port, which is the port on which 3WXM Services listens for requests from 3WXM client.

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- Select the arrow buttons to change the SNMP Trap Receiver Port, which is the port on which SNMP traps are received. Also select the trap type (SNMPv1 or SNMPv3) you want 3WXM Services to receive from WX switches.

On each switch in the network plan, you must enable notifications and configure 3WXM Services as a notification target (trap receiver).

3WXM Services does not start listening for SNMP notifications from switches until you save the network plan.

- From the Key Store area of the window, specify security settings.
- From the Access Control area, define user accounts. For more information about access control, see "3WXM Access Control" on page 23.

(The Auto-Config IP Subnet Matching option is used for field replacement of WX switches. For information, see the "Configuring WX Switches Remotely" chapter in the *Wireless LAN Switch Manager Reference Manual*.)

To change these settings, use the Service Settings tab of the 3WXM Services Setup dialog.

To select monitoring settings

All monitoring options are enabled by default. You do not need to enable them and you do not need to specify the switches you want to monitor. However, for 3WXM Services to receive trap data from WX switches, SNMP notifications must be enabled and 3WXM Services must be configured as a notification target on each of the switches.

To start gathering data for monitoring, deploy your configuration to the network. For information about deploying your configuration, see "Deploy Your Configuration" on page 155.

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3WXM Access Control

You can create a user account with administrator, provision, or monitor privileges. See Table 6 for basic privilege definitions. For a details, see the "Restricting Access to 3WXM" section in the "Getting Started" chapter of the *Wireless LAN Switch Manager Reference Manual*

Table 6 User Privilege Levels

Privilege Level	Access Control	Configuration	Monitoring
Administrator	yes	yes	yes
Provision	no	yes	yes
Monitor	no	no	yes

To configure access control

1. Select **Tools** > **3WXM Services Setup** from the 3WXM main tool bar. The 3WXM Services Setup window is displayed.
2. In the Access Control area of the window, deselect **Allow All Users**.
3. Enter a username and password for administrative access, then click **OK**. (You must configure an admin account before you can configure provision or monitor accounts.)
4. Select **Add Admin Account**, **Add Provision Account**, or **Add Monitor Account**. A dialog box is displayed.
5. Enter the account name and the password and click **OK**.
6. To remove an account, select the account and click **Remove Account**.

3WXM Interface

This section contains the following topics:

- "Display the Main Window" on page 24
- "Using the Toolbar and Menu Bar" on page 25
- "Setting Preferences" on page 26
- "Easy Configuration Using Wizards" on page 26
- "View Topology" on page 26
- "Getting Help" on page 27

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Display the Main Window

When you start 3WXM client and log onto 3WXM Services, a network plan is displayed by the 3WXM client. (See Figure 2 on page 25.)

- *Organizer* panel displays a network tree representing your WLAN's devices and configurations on those devices. You can use it to navigate to Policy configurations, Equipment within your network, and network Sites.

  When you select a device or configuration in the tree, the context-sensitive information about the device or configuration is displayed to the right in the Content and Information panels.

- *Content* panel displays context-sensitive information about the device or configuration selected from the tree in the Organizer panel. From the Content panel, you can view 3Com devices and their status, verify 3Com device configurations in the network plan and in the network, and display event logs and Rogue detection results.

- *Alerts* panel displays a summary of alerts, including network and configuration verification, Rogue detection, and local and network changes. Click on a summary to display details.

  The Lock icon indicates whether the network plan has been locked. When you make changes to a network plan, 3WXM locks it on the server. The lock prevents other clients who open the network plan from modifying it while you are making changes. The network plan remains locked until you save your changes, after which the lock is released.

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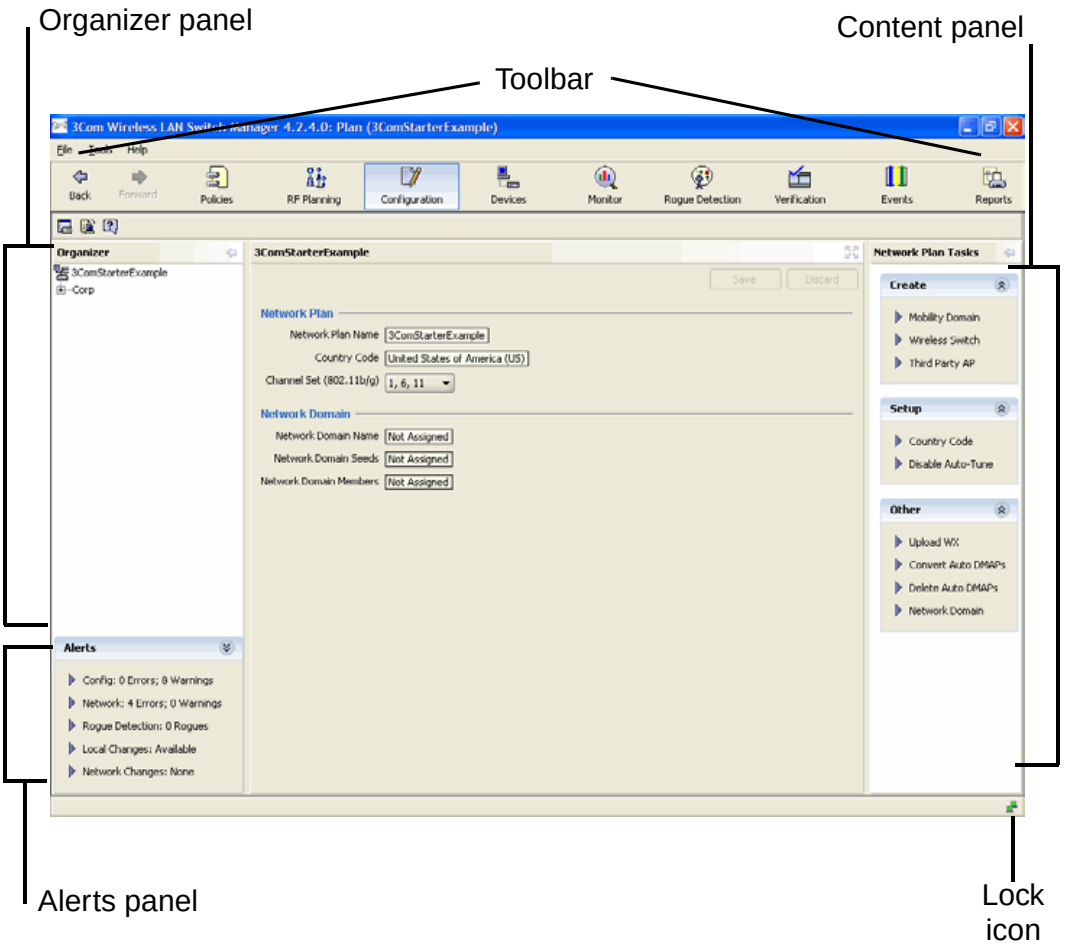
Figure 2 Main 3WXM Window with Open Network Plan



Using the Toolbar and Menu Bar

The main 3WXM window has a toolbar that provides quick access to features. You can use the **Back** and **Forward** buttons to cycle through your display selections.

The menu bar (located above the toolbar) provides access to administrative options such as plan management and access to online help. For example, to open another network plan, select **File > Switch Network Plan**.

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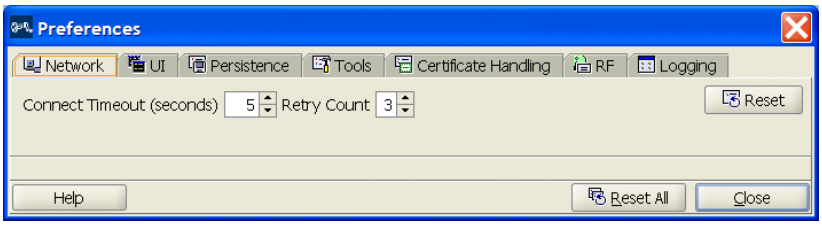
Setting Preferences

You can set network and user interface preferences, as well as preferences for save interval and autosave, certificate handling, RF monitoring, and logging.

1 Select **Tools** > **Preferences** from the 3WXM main tool bar.

The Preferences wizard is displayed.



2 Select any of the tabs, make modifications in the fields, and select **Reset All** to reset preferences.

Easy Configuration Using Wizards

Wizards help walk administrators through configuration steps. There are many wizards in the 3WXM application.

Enter the required fields and click **Next** at the bottom of the wizard to display the next step. Click **Cancel** to discard any changes made with the wizard. When you are done, click **Finish** or **OK** to save changes.

You can right-click on many objects to display the **Insert** option. Select **Insert** to create a new object that is a "child" of the selected object.

View Topology

You can display a topology view of managed devices in your WLAN and their relationships to each other. You can also click on the devices in the topology view to display summary monitoring information about each one.

To display a topology view of your network

1 Select the Monitor toolbar option.

2 In the Equipment section of the Organizer panel, select a Mobility Domain or a WX switch.

3 If not already selected, select **Explore** from the drop-down list in the Monitor tab. The topology view of the selected object is displayed.

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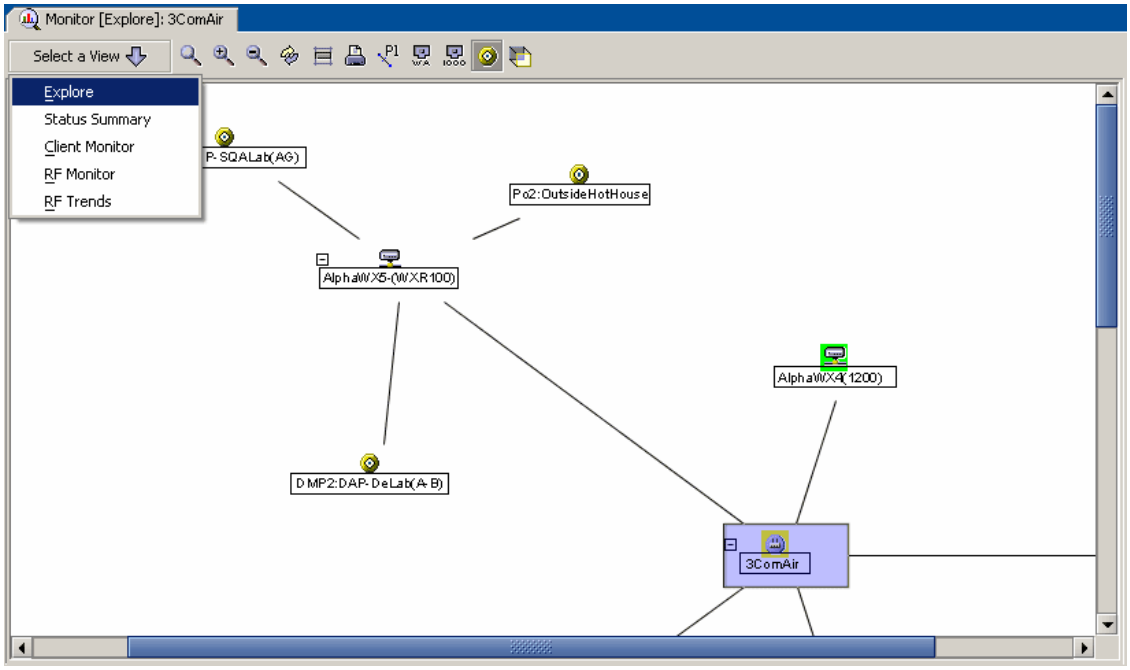
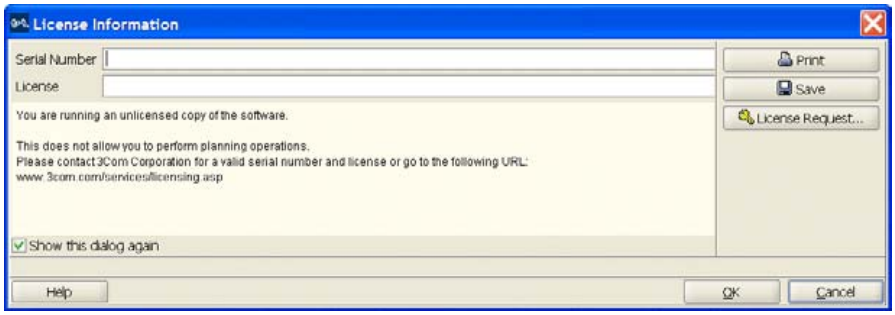


You also can select a radio, in which case the floor plan where the radio is located is displayed, with status for all MAPs on that floor.

Getting Help

Click **Help** from the Main menu bar to access different types of help:

1. Select **Help** > **Help** to display HTML help about configuring and using 3WXM.
2. Select **Help** > **Licensing** to view product licensing information.



3. Select **Help** > **Report Problem** to report a problem to 3Com Technical Support.
4. Select **Help** > **About 3WXM** to display information about 3WXM and to display the Release Notes. You also can click **Force GC** (garbage collection) to free resources.

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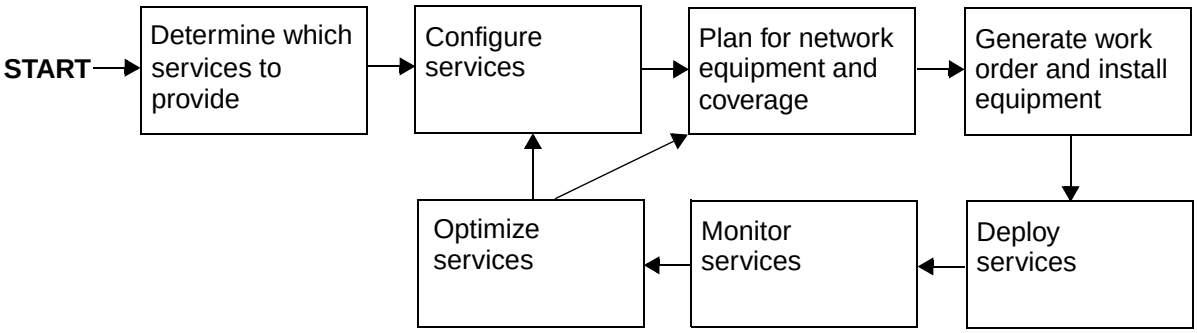
2 Planning and Managing Your Wireless Network with 3WXM

This chapter contains information about planning and managing your wireless network with 3WXM. Planning your wireless network is highly recommended because it not only helps you configure and deploy it, but also aids in scaling and monitoring your network. 3Com provides you with flexible tools to assist with network planning.

You plan your wireless network to support the services you want to offer your employees, guests, or customers. Figure 3 describes the process you will follow to establish services in your company or organization, beginning with determining the services you want to offer. Each step in the process is described in this chapter.

Figure 3 Process to Establish Wireless Services



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Which Services To Provide?

What is a service?: A service is a concept (not a selectable item in the 3WXM interface) that represents a set of options you configure and deploy on your wireless network. You configure services to support the different levels of network access you need to provide. For example, a service configured to support employee access will have different options configured to provide greater access to the network. In contrast, a service configured for guest access typically restricts users to limited or no internal network access, but easily provides a gateway connection to the Internet.

A service can be fully isolated and independent of other services on the network (multi-hosted access is typically isolated), or you can reuse part of a service configuration for another service you want to provide. Each service has potential authentications (802.1X, web page, MAC address, or "last resort") and potential encryptions (802.11i, WPA, WEP, or unencrypted).

Purpose of this section: To provide information about services that you can configure using 3WXM.

Why is this important?: Understanding the services you can configure with 3WXM is the first step in planning and configuring your network.

The first step you need to do when planning your wireless network is to determine which services your organization requires. The three common types of services are:

- Employee access
- Guest access
- Voice over Wireless IP (VoWIP)

Employee access is typically secure, encrypted access to the wireless network. Guest access is access (possibly unencrypted) for visitors at your location. If you intend to resell services to other providers, you will need to provide multi-hosted access.

Determining the services you will need at the beginning of the planning process results in configuration data. The configuration data is used to create service profiles and AAA rules for each service. A *service profile* is a subset of a radio profile. A *radio profile* is a common set of configuration parameters that can be applied to many MAP radios.

See "Create a Service Profile" on page 99 for information about configuring services.

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Network Plan

What is a network plan?: A network plan is the workspace in 3WXM you use to design a wireless network.

Why is this important?: You can better manage and visualize your network topology by creating a detailed and accurate network plan.

You can start by creating a device-oriented (WX switches and MAPs) view of your network without any geographic information about your site—no floor dimensions, building material information, or RF obstacle information. You can go a step further and provide some geographic information by adding floor dimensions, your RF coverage area, and some attenuation information, such as elevator shafts or internal concrete walls. If you want to enjoy the full benefits of network monitoring and visualization, you can create a detailed network plan. This is done by importing detailed building and floor plans into 3WXM, defining RF obstacles, and defining the quality of coverage (traffic engineering parameters) you want for specific RF coverage areas.

RF Coverage Area

What is an RF coverage area?: An RF coverage area is the geographical area in which IEEE 802.11 radios provide wireless services.

Purpose of this section: To describe the three techniques you can use for RF coverage.

Why is this important?: By understanding available RF coverage planning techniques, you can use the technique that meets your organization's requirements.

There are three techniques you can use to get your wireless network started:

- *RF Auto-Tuning* lets you use the default auto tuning feature to select power and channel settings for RF signals in your RF coverage area. You upload the WX switches into 3WXM, configure the MAPs, enable RF Auto-Tuning, and deploy.

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- *RF Auto-Tuning with Modelling*, as with the RF Auto-Tuning technique, lets you set the auto tuning feature to adjust power and channel settings to provide RF signals to the coverage area for your users. Enhance the auto tuning feature by providing modelling information about your geographic location. By providing some information about your buildings and floors, you add enough details into 3WXM so that your can better visualize your network topology and support improved monitoring at your site.
- *RF Planning* is a technique you can use to create a detailed network plan that provides powerful monitoring and visualization benefits. Unlike RF Auto-Tuning or RF Auto-Tuning with Modelling, you do not rely on the auto tuning feature. Instead, you fully model your geographic location with detailed information about your floors, and specify your RF coverage areas and your RF obstacles.

Each of these methods is described in the sections that follow.

RF Auto-Tuning

To use the RF Auto-Tuning technique:

- Physically place WX switches and the MAPs in their desired locations.
  - Upload a WX switch configuration and deploy it.
  - Enable the RF Auto-Tuning feature.

  This is a great way to install a WX switch and some MAPs, and observe how the network operates. The RF Auto-Tuning plan is best suited to networks containing fewer MAPs.

RF Auto-Tuning with Modelling

To use the RF Auto-Tuning with Modelling technique, you add to the RF Auto-Tuning technique by providing some geographical modelling about your building, floors, and RF coverage area. You also add RF obstacle information for major obstacles (like concrete walls, windows, and elevator shafts) that affect attenuation—the quality of RF signals emitted from and received by the MAPs. By adding geographical modelling, you will be able to manage your network in the context of that geographical information. For example, you will be able to manage your network overlaid on a floor plan, versus managing an abstract logical group of switches and MAPs.

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RF Planning

To do RF Planning, you provide detailed information about your site and buildings by importing AutoCAD DXF™, AutoCAD DWG, JPEG, or GIF floor plan files of the buildings into 3WXM. As you import the floor plans, you can modify them to add or remove RF obstacles. You define RF obstacles by specifying the attenuation factor in decibels for the obstacle. In addition, 3WXM includes a library of attenuators for building obstacles. The library includes doors, walls, ceilings, and other physical obstructions that you can select. 3WXM factors in the impact these objects have on how the radio frequency (RF) signals flow through a given site.

If the network contains third-party or pre-installed APs, you can enter information for these APs so that 3WXM takes the APs into account when calculating the placement (and optionally, the channel and power settings) of the 3Com MAPs.

By using this technique, you receive these substantial benefits:

- Instead of you making a "best guess" as to how many MAPs you require for the desired coverage and where MAPs should be placed, 3WXM automatically calculates how many MAPs you need and where to place MAPs for optimal positioning.
- You can generate a deployable work order to help installers place WX switches and MAPs.
- You automatically receive a deployable configuration that includes optimum power and channel settings.
- You enjoy more accurate monitoring options and network visualization based on the additional geographic modelling information loaded into 3WXM.

Which Planning Method Should I Use?

The more detailed your network plan, the better you will be able to manage and monitor the network. However, there are other requirements organizations should consider.

3Com recommends using the RF Auto-Tuning technique if you are installing MAPs without consideration to blanket coverage, throughput concerns, or the number of users for whom service will be provided. RF Auto-Tuning is ideal for small areas; for example, coverage that only requires a few MAPs, or widely dispersed areas in a building, such as conference rooms.

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Use the RF Auto-Tuning with Modelling technique if you want to better monitor your wireless network in terms of buildings, floors, or coverage areas. You may only be able to locate inaccurate or incomplete building and floor plans (perhaps only a JPEG file), but with even a bit more geographic modelling of your site, you boost your ability to manage and visualize your network.

Use RF Planning when you want to use all the tools provided in 3WXM to deploy, manage, and monitor your network. You likely have multiple constituencies of users you need to consider; for example, sets of users that are mobile and wireless that have specific throughput and bandwidth needs. One group of users may be mobile and require high throughput performance (a higher bandwidth), while another group of users are more stationary and require less throughput. Additionally, you may be planning for future capacity, and need to add as much detailed information as you can about your site in order to plan for the future.

See Table 7 for some guidelines to help you determine what planning technique is right for your organization.

Table 7 Planning Techniques to Use

Concern	If yes, use	If No, use
Do I have adequate time to add geographic modelling and RF obstacle information?	RF Auto-Tuning with Modelling	RF Auto-Tuning
Can I locate accurate building and floor plans?	RF Planning or RF Auto-Tuning with Modelling	RF Auto-Tuning with Modelling
Do I need to plan for capacity of users or quality of coverage (traffic engineering concerns) for certain users?	RF Planning	RF Auto-Tuning or RF Auto-Tuning with Modelling
Do I need to visualize coverage accurately?	RF Planning	RF Auto-Tuning or RF Auto-Tuning with Modelling
Do I need to locate users?	RF Planning or RF Auto-Tuning with Modelling	RF Auto-Tuning
Do I need to locate rogue APs?	RF Planning or RF Auto-Tuning with Modelling	RF Auto-Tuning

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Table 7 Planning Techniques to Use

Concern	If yes, use	If No, use
Do I want to better monitor my wireless network in terms of buildings, floors, or coverage areas?	RF Planning or RF Auto-Tuning with Modelling	RF Auto-Tuning

If RF Planning does not fit your requirements now, you can always use the RF Planning technique in the future when you have the need, the time, and the necessary floor plans available. You also can leverage the data in RF Auto-Tuning and convert these RF measurements to configured baseline values for planning.

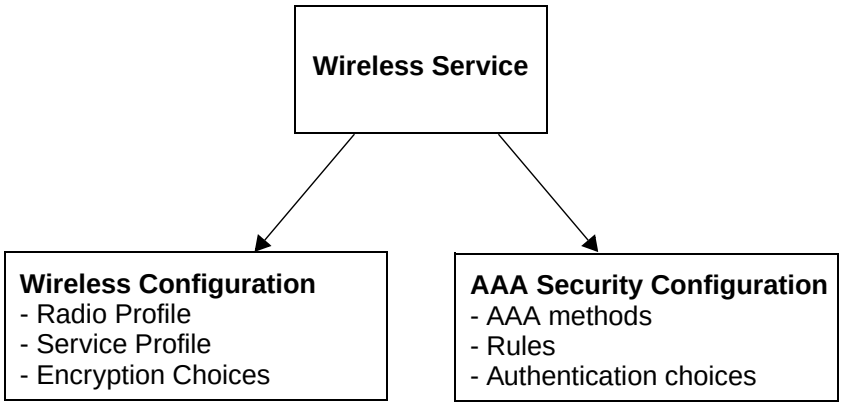
Configuration

Purpose of this section: To describe the main areas of the 3Com Network (WX switch and MAPs) you will configure in 3WXM.

Why is this important?: To provide you with overview information about the software so that you can plan a configuration to support the services you require.

You will configure the wireless configuration and AAA security configuration for each service you provide on your wireless network. You also create a basic configuration for the WX switch.

Figure 4 Configuration Required for Each Service



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This section contains information about:

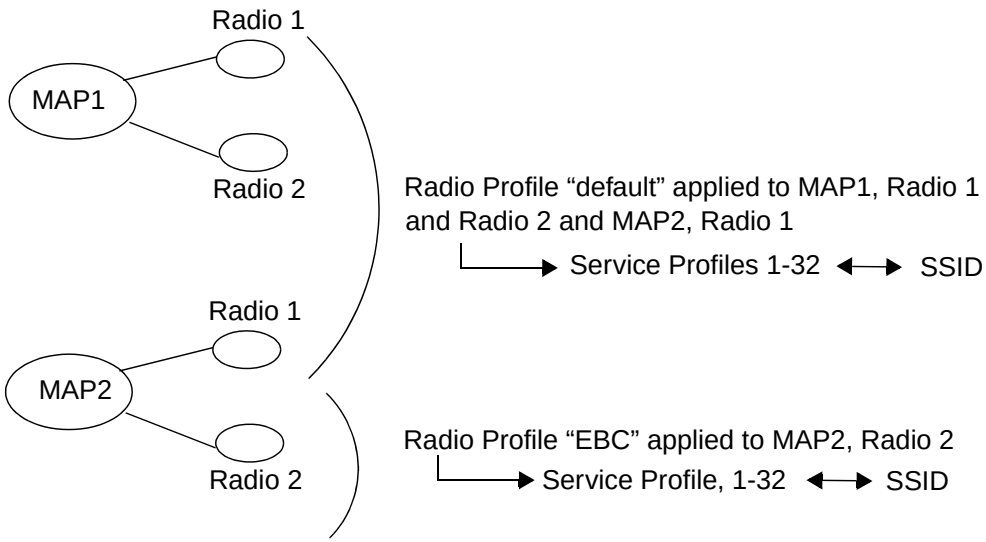
- "Wireless Configuration" on page 36
- "AAA Security Configuration" on page 38
- "System and Administration Configuration" on page 40

Wireless Configuration

Wireless configuration focuses on the configuration tasks (radio configuration and AAA configuration) you do to deliver the virtual wireless services you want to provide on your network. You enable the MAPs to operate according to your planned RF coverage requirements. Most of the wireless configuration is done as you plan your RF coverage and create your radio profiles and service profiles.

A radio profile is used to apply common settings to multiple radios, and each radio profile can support up to 32 service profiles, one for each service you want to support. You specify in the service profile an SSID for each service and the type of encryption mechanisms to be used by the MAP radios. This gives the radio the potential to look like 32 different and independent MAPs. (See Figure 5.)

Figure 5 Radio and Service Profiles



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You must configure a radio profile to set attributes that you can apply to multiple radios. Rather than configuring each radio individually, you create a radio profile and apply it to multiple radios that you select. You can also create a radio profile as part of a policy and apply it to MAP access points on different WX switches.

The radio profile can contain RF Auto-Tuning settings and IEEE 802.11 settings that control how the data is received and transmitted. You can select RF Auto-Tuning in the radio profile to apply AutoRF settings (enable or disable auto tuning of power and channels) to radios en masse via the radio profile. AutoRF enabled through the radio profile to multiple radios can be easily disabled, too, should you want to go to full RF planning. You can set specific IEEE 802.11 settings, such as beacon, DTIM intervals, and the fragment threshold to control how packets are transmitted.

A default radio profile named default is provided and cannot be deleted.

For each service you want to provide, you configure the following items in a service profile:

- The SSID name
- SSID advertisement (whether the SSID name is beaconed)
- Whether the SSID name is encrypted or clear (not encrypted)
- Web page (if using WebAAA)
- Multiple encryption choices (Dynamic/static WEP, WPA, WEP + WPA, 802.11i)

You also must configure AAA security configuration items for each service. For more information, see "AAA Security Configuration" on page 38.

The encryption type you use depends on the type of services you're offering. Employee access is typically encrypted, guest access is typically clear (no encryption), and multi-host or "multiple virtualized services" service can be encrypted, with each SSID being matched with its own service profile.

If services are being used for customer corporate entities (e.g. different airlines on an airport wireless net), then they would probably use 802.1X and strong encryption with web guest access for their airport club guests.

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If the services are being used to advertise multiple wireless service providers (WISP), such as T-Mobile™, Wayport ®, and Boingo Wireless™, then these services would probably be completely open. However, they would likely be assigned to their own dedicated subnet containing their proxy server/billing gateway.

AAA Security Configuration

An administrator can control the way in which users access the network. For each service you provide, you can configure unique authentication, authorization, and accounting (AAA) security features, creating an entirely virtualized wireless service. For each service, you configure:

- Multiple authentication choices (802.1X, Web, AAA, MAC authentication, Bonded Auth, open)
- AAA methods (up to four RADIUS server groups, or a local database on the WX switch)

Authentication

Authentication is the method of determining whether a user is allowed access to your network. Users can be authenticated by a RADIUS server (pass-through) or by the WX switch local database (local). The WX switch can also assist the RADIUS server by performing the Extensible Authentication Protocol (EAP) processing for the server (offload).

To authenticate users, you will need to configure users either in the local database or on RADIUS servers. Each user will have a username, password, and RADIUS and/or vendor-specific attributes (VSAs). You will also need to configure authentication rules (802.1X, MAC, last-resort, or web authentication).

See Figure 6 on page 39 to see a flowchart representing the authentication process. Generally, 802.1X authentication is attempted first. If the user fails, then MAC authentication is attempted. If this fails, then last resort and web authentication is used. For a service profile, you specify *either* web authentication, last-resort, or none in the auth-fall-thru box. You can only select one.

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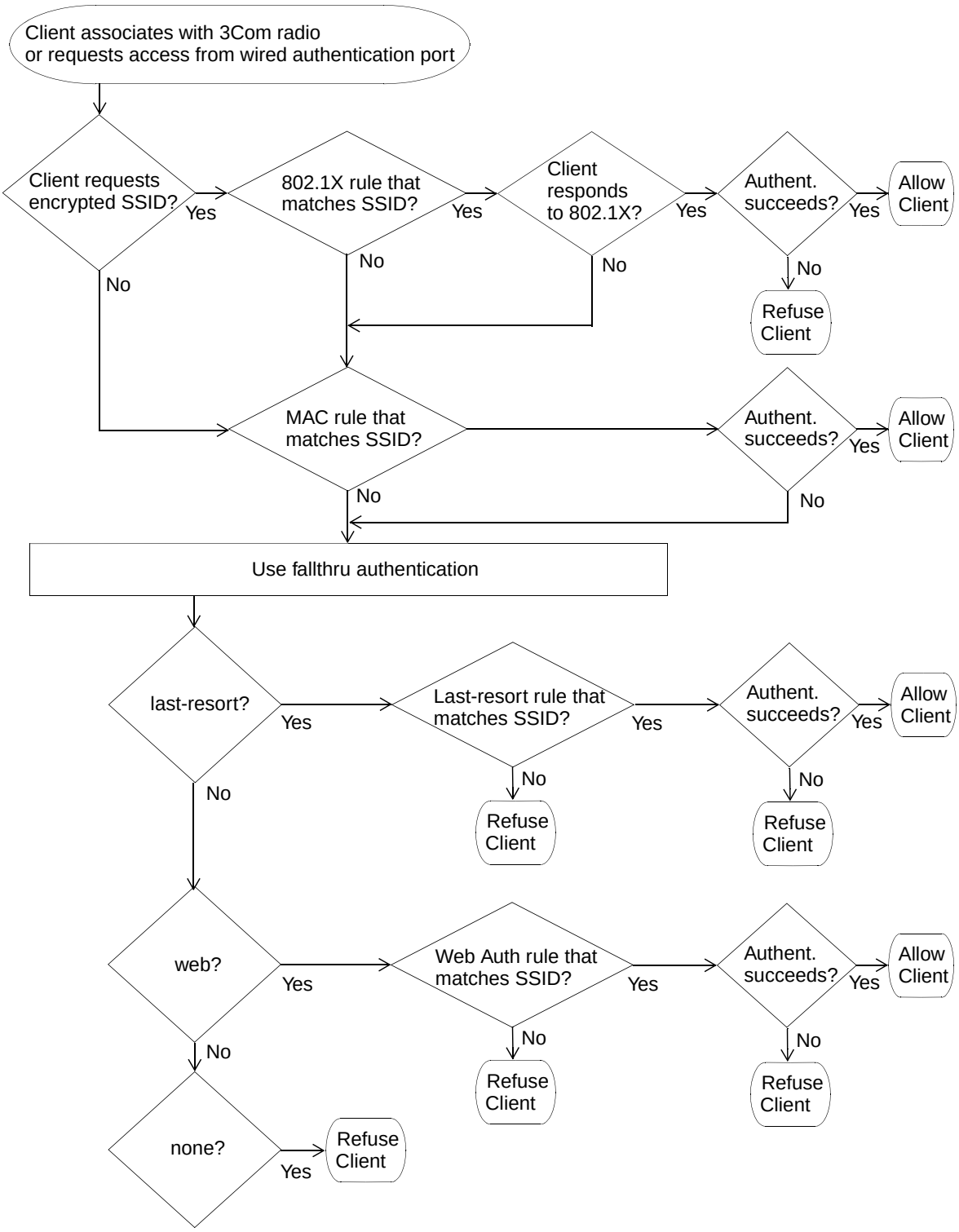
Figure 6 Authentication Flowchart for Network Users



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Authorization

Authorization is the method for providing users with specific rights to the network by associating attribute-value (AV) pairs to the user. AAA authorization works by assembling a set of attributes that describe what the user is authorized to perform. These attributes are compared to the information contained in a local database or on a RADIUS server for a given user and the result is returned to the WX switch to determine the user's actual capabilities and restrictions.

You can configure attributes, such as the time of day or specific VLAN access. You can also control access using security access control lists (ACLs), Mobility Profiles™, and Location Policies. Security ACLs permit or deny traffic based on IP protocol, IP addresses and, optionally, TCP or UDP port. They also can be used to set class-of-service (CoS) values in a packet. Mobility Profiles contain attributes to allow or deny access to specific parts of the network for a specific user or group of users. Location Policies are an ordered list of location policy rules based on a user glob, VLAN, and/or ports. A Location Policy can be configured if you need to override the configured AAA user authorization attributes locally for a specific WX.

Accounting

Accounting collects and sends information used for billing, auditing, and reporting—for example, user identities, connection start and stop times, the number of packets received and sent, and the number of bytes transferred. You can track sessions through accounting information stored locally or on a remote RADIUS server. As network users roam throughout the network, accounting records track them and their network usage.

System and Administration Configuration

A Mobility Domain is a collection of WX switches that work together to support roaming users. One of the WX switches is defined as a seed device, which distributes information to the other WX switches defined in the Mobility Domain.

A Mobility Domain allows users to roam geographically from one WX switch to another without losing network connectivity. Users connect as a member of a VLAN through their authorized identities.

You can add switches to a network plan as members of a Mobility Domain or as standalone switches. After a switch is added, you can move it into or out of a Mobility Domain.

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You can create the following types of WX switches:

- WX4400—Provides four dual-interface gigabit Ethernet ports. Each port has a 1000BASE-TX copper interface and a Gigabit interface converter (GBIC) slot for insertion of a 1000BASE-SX or 1000BASE-LX fiber-optic interface.
- WX1200—Provides eight 10/100 Ethernet ports, six of which support PoE.
- WXR100—Provides two 10/100 Ethernet ports, one of which supports PoE.
- WX2200—Provides twenty 10/100BASE-TX Ethernet ports, all of which support Power over Ethernet (PoE). WX2200 switches also provide two slots for 1000BASE-SX or 1000BASE-LX fiber-optic gigabit Ethernet ports.

You perform the following tasks to create and initially configure a WX switch:

- Configure basic WX switch properties.
- Configure WX switch connection information.
- Configure boot information.

Configure Basic WX Switch Properties

To configure basic WX switch properties, you specify a name, select a model, select its location by wiring closet, and select the Mobility System Software (MSS) you want to run on the switch. Optionally, you can select an MSS image to download when you deploy changes to the WX.

You also can specify if the switch is managed. A WX switch that is physically installed as well as configured can be managed. You can deploy configuration changes only to managed devices, and 3WXM periodically checks the managed WX switches in the network for changes. You also can fully configure a switch without it being physically installed (unmanaged). Having an unmanaged device in your network plan may be useful for predeployment purposes.

Basic configuration also includes specifying how you will manage the switch. You can manage it through HTTPS, Telnet, and Secure Shell (SSH). You also can enable monitoring using the Simple Network Management Protocol (SNMP) to exchange information about network activity between your network devices.

For more information about configuring basic WX switch properties, see "Perform Basic Administrative Tasks" on page 157.

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For detailed information about configuring basic WX switch properties, see the *Wireless LAN Switch and Controller Quick Start Guide*.

Configure WX Switch Connection Information

You need to supply connection information for the WX switch on both the WX switch and in 3WXM when you make the WX a managed device. Connection information includes the IP address of the switch and how it will connect to the backbone; for example, by means of a VLAN or a port.

Configure Boot Information

You select the software image that the WX will use when reset, or optionally, the configuration file the WX will use when reset.

Equipment Installation

To physically install a WX switch:

1. Unpack and rack the WX switch in the wiring closet or data center location.
2. Plug the WX switch electrical cord into a power outlet.
3. Connect a network access cable from your existing network to one of the Ethernet ports on the switch (10/100 or Gigabit Ethernet, depending on the WX model and available interfaces on the network).

Remember the port number you used. You will need to know this when performing the initial setup of the switch.

4. Connect a serial interface to the console port of the WX switch to access the console's CLI for initial setup.

To physically install MAPs:

1. Instruct the cabling installer to run the Cat. 5 Ethernet cable from the closest wiring closet to intended location of the MAP.
2. Unpack the MAP, and select the appropriate mounting kit for your installation location.
3. Install the MAP at the indicated location on the floor.
4. Connect the Cat 5. Ethernet cable(s) to the MAP.
5. At the wiring closet, connect the MAP to the infrastructure equipment:
   a. If you are directly connecting the MAP to a WX switch, plug the other cable end(s) to the indicated port(s).

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b If you are indirectly connecting the WX to the switch, plug the other cable end(s) to an available network port on the wiring closet switch. If the switch does not supply PoE, then ensure that a mid-span PoE device is inserted in-line with the connection.

Deployment

What is deployment?: Sending the WX configuration information in the 3WXM network plan to your WX switch.

Purpose of this section: To describe how changes are made to 3WXM and deployed to your network.

Why is this important?: To understand best practices for sending and deploying configurations to your WX.

Configuration changes are collected in 3WXM when you save them, but are not applied to WX switches until you send the changes to your network. Any changes you make to your network in 3WXM are saved, but not applied to your network until they are deployed. This method makes it easy to apply configurations simultaneously to multiple WX switches, or you can deploy changes to a single WX switch.

Management and Monitoring

Purpose of this section: To provide an overview of the management and monitoring capabilities offered in 3WXM.

Why is this important?: Understanding the management and monitoring tools available in 3WXM can help you to quickly identify and correct problems in your wireless network, as well as to provide you with the statistics and reporting information you need to optimize your network.

This section talks about the following management and monitoring features:

- Network Status
- RF monitoring
- Client monitoring
- Rogue detection
- Event logging
- Verification
- Reporting

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Network Status

3WXM provides summary status on devices in the network at the Mobility Domain, switch or MAP level. View the summary status as the initial step in monitoring. Summary status displays the operational status of WX switches, MAPs, and their radios (whether they are up or down).

In addition, 3WXM collects network statistics for devices, including system-level events and statistics for the wired network.

The Alerts section in the bottom, left panel in 3WXM displays top-level status information. The Alerts panel provides you with summary error and warning information for the following areas:

- Configuration—indicates network plan configuration issues
- Network—indicates managed network issues
- Rogue detection—identifies the number of rogue APs detected
- Local changes—indicates changes in 3WXM that can be deployed to the network
- Network changes—indicates configuration changes in the network

You can display a topology view of your network, including the state and relationship of devices. You can right-mouse click on a device in the topology to display the status of that device. The display can include the wired network, third-party APs, and rogue access points (access points that are not authorized to operate in your network).

You also can set thresholds for events. If the threshold is crossed, the affected device is flagged, and a star is placed beside the parameter that triggered the threshold.

RF Monitoring

RF monitoring provides you with current and historical information about your radio health and activity. Data collected for the RF environment and the RF neighborhood includes the following items:

- RF environment
  - Channel
  - Noise
  - CRC errors
  - PHY errors
  - Packet retransmissions
  - Percent utilization

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- RF neighborhood
  - Transmitters (heard by this radio)
  - Listeners (who heard this radio)
  - Neighbors
  - BSSID to SSID mapping
  - Channel
  - RSSI

Statistics collected for the RF environment provides data on a per-channel basis. You can view noise levels, cyclic redundancy check (CRC) and PHY errors, packet retransmissions and percent utilization.

Data collected for the RF neighborhood displays the neighboring radios. This information can be viewed as a list of radios heard by a particular radio, as well as a list of radios who can hear a particular radio.

You also can display trending information on a per-radio basis. Trending collects radio statistics and charts them on a time basis. For example, you could display average throughput rates for the previous 30 days, week, or day. You can display and print the charts from 3WXM, as well as generate a report.

Client Monitoring

Client monitoring provides current and historical information about the clients using your network, including client activity, watch list clients, current client sessions, and the ability to locate clients at your site. 3WXM displays the data that WX switches collect on user sessions—either for a single user, users associated with a MAP, users associated with a specific radio, or users added to a watch list.

By viewing monitoring information for a user or a group of users, you can troubleshoot problems originating from bandwidth constraints or roaming patterns. You can collect statistics and view reports on:

- Client associations, authentication, and authorization failures
- Client activity, such as roaming and successful authorization
- Current session status, location history, and statistics
- Specifics on users over a period of time; information can be gathered up to 30 days for session status, location history, client errors, and client activity on users you place on the watch list

If you use 3WXM RF Planning, you also can display the approximate geographic locations of clients.

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Rogue Detection

A rogue AP is an access point that is not authorized to operate in or near your network. You can use RF countermeasures to deny service to or from a targeted rogue AP, and render them ineffective. Once a rogue AP is detected and reported, the closest 3Com MAP is assigned to perform RF countermeasures. By spoofing various 802.11 control messages, the MAP's countermeasures disrupt association and authentication attempts to the rogue AP by any new clients. This also disrupts any active communications between any existing client and rogue AP.

You can collect statistics and view reports on:

- Current rogue list, aggregated for the whole network
- Current hour rogue list
- Current day rogue list
- 30 days of rogue history, using best listener data
- Rogue lifecycle events (when the rogue was first seen, by whom, and when it went away)
- Counter-measure activity

The number of currently detected rogues is conveniently displayed in the Alerts panel.

If you use 3WXM RF Planning, you also can display the approximate geographic locations of rogue devices and their clients.

Event Logging

3WXM incorporates a powerful and flexible display interface for all events collected by the system. Events are stored on a per-WX basis and are collected continuously. Customizable filters can be created to easily drill down to specific information the event log database. You can filter events based on:

- Category
- Severity
- Date and time ranges
- WX switch
- 3WXM client and services log
- Specific text string matches

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Verification

Both configuration verification and network verification rules are checked for any inconsistencies or problems. Verification rules include "instant fix" resolutions. Instant fix resolutions are errors that can be automatically fixed, or alternatively providing a hot link to the object containing the error.

You can selectively disable any rule. Disabling a rule is useful if you wish to ignore a warning and do not want to see it displayed anymore. The number of configuration and network errors or warnings are conveniently displayed in the Alerts panel.

Reporting

3WXM uses a database to collect and store client, RF, and other system dynamic data, such as statistics, status, events, and traps. You can generate reports from the monitoring and configuration data collected in the database. A report can have a selectable scope and a selectable time period and in some cases, query filter parameters. See Table 8 for a listing and description of the reports you can generate in 3WXM.

Table 8 3WXM Reports

Report	Description
Configuration Reports	
Inventory Report	Provides information about the WX switches and MAPs in your network.
Mobility domain configuration	Provides a configuration overview, providing data that spans multiple WX switches. For example, it contains information about the AAA/RADIUS setup, SSIDs, and where they are configured.
Wireless Switch (WX) Configuration	Provides details on a WX configuration.
Site Survey Order	Provides a map of your site that can be used to guide a site survey.
Work Order	Provides information installers use to physically install WX switches and MAPs.
Monitoring Reports	
Client Session Summary	Displays summary data for sessions in the selected scope.
Client Session Details	Displays detailed session information.

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Table 8 3WXM Reports (continued)

Report	Description
Client Errors	Provides data on client-related health in the network over time; for example, if there is a large number of association failures in some area of the network.
Watch List Clients	Contains detailed information for the clients on the Watch List.
Network Usage	Provides information about network resource usage and client activity.
RF Summary	Provides information about overall network health using selected radio statistics. It can be used to compare RF environments across the network and isolate potential problem areas.
Radio Details	Provides a detailed set of statistical information for each radio in the selected MAP.
Rogue Details	Provides current and historical information for a selected rogue.
Rogue Summary	Provides information for all visible rogues for a selected time.

RF Plan Optimization

What is optimization?: Importing RF measurement data into an RF model to improve the accuracy of the model.

Purpose of this section: Provides an overview of optimization methods.

Why is this important?: A network plan contains the configuration settings that determine the performance of your wireless network. Optimization of the RF model leads to a more successful RF plan. The ultimate result is an accurate visualization of your RF coverage, better-defined statistics for monitoring, and the ability to more accurately plan for and improve network performance.

You can optimize your network based on user and network statistics gathered from:

- The monitoring data in 3WXM
- A site survey

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Based on RF measurement data you gather in 3WXM to optimize the RF model of a floor, you can make configuration changes in the software to improve signal strength and coverage for groups or individuals, modify MAP locations, or add additional equipment to your wireless network if statistics indicate your network has outgrown the support provided by its current deployment of WX switches and MAPs.

You also can import RF measurement data based on a site survey done outside of 3WXM. See the "Using RF Measurements from MAPs" on page 180 for general guidelines about performing a site survey.

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3 CONFIGURING WIRELESS SERVICES

What are Services?

A service is a concept (not a selectable item in the 3WXM interface) that represents a set of options you configure and deploy on your wireless network. Services are configured to provide various levels of wireless network access to users, such as secure employee access, guest access, multi-hosted access, or Voice over Wireless IP (VoWIP) access.

You can configure a service to be independent of other services on your wireless network, or you may be able to share configuration components among services. For example, multi-hosted access is typically fully isolated from other services (no shared configuration), while services that provide for guest and employee access in a single corporation may share a common radio profile. In this way, you can reuse part of the service configuration for other services you want to provide. You could configure a service for employee access; then reuse part of the configuration to provide services for guest access.

Each service has potential authentication types (802.1X, web page, MAC address, or open access) and potential encryption types (802.11i, WPA, WEP, or unencrypted). (Open Access is sometimes called *last resort*.)

This chapter contains examples to help you configure the following types of service sets:

- Employee access (802.1X)
- Guest access (Web Portal)
- Voice over IP (MAC AAA)

The configuration examples in this chapter take place on a WX switch already in the network plan. However, you also can preconfigure services in a policy and apply the policy to WX switches later.

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Configure Employee Access Services

Services for Employee access are typically configured to provide secure, encrypted access to the wireless network.

The following sections provide information about how to configure Employee access:

- "Task Table" on page 52
- "Step Summary" on page 54
- "Example: Configure Employee Access" on page 55

Table 9 on page 52 contains the tasks you need to perform to configure Employee access services. The summary provides the configurable options you should set. The section "Example: Configure Employee Access" on page 55 guides you through the primary wizards and pages in 3WXM to configure Employee access services.

Task Table

Table 9 contains the tasks you need to perform to create a service for employee access. For a summary of configurable items, see "Step Summary" on page 54. For detailed steps about how to perform each of these tasks, see "Example: Configure Employee Access" on page 55.

Table 9 Creating a Service for Employee Access

Task	Path	Primary Parameters to Configure
"Create a Radio Profile" on page 56	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand Wireless. **4** Click on Radio Profiles. **5** Select Radio Profile in the task list.	From the Create Radio Profile wizard: ▪ Radio profile name: enter a name After you create the service profile, you can map it to the radio profile. After you install the MAPs, you can map their radios to the radio profile. **Note:** The examples in this chapter configure the radio profile first. However, you also can configure the radio profile later as part of service profile configuration.

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Table 9 Creating a Service for Employee Access (continued)

Task	Path	Primary Parameters to Configure
"Configure RADIUS Servers" on page 58	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand AAA. **4** Click RADIUS. **5** Select RADIUS Server in the Task List.	From the Create RADIUS Server wizard: ▪ Name: enter server name ▪ IP Address: enter server IP address ▪ Key: enter key ▪ Server group: allow the wizard to create it On the RADIUS servers themselves, configure the AAA backed (not in 3WXM): ▪ Set up each WX switch as a RADIUS client. ▪ Define the 3Com vendor-specific attributes (VSAs) in the RADIUS server's dictionary. ▪ Configure each user record with authorization rules (username and password). ▪ Configure each user with either the Vlan-Name attribute (3Com VSA) or the RADIUS Tunnel-Private-Group-ID to assign users to VLANs. ▪ Configure authentication rules (802.1X, MAC, Open Access, or Web Portal).

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Table 9 Creating a Service for Employee Access (continued)

Task	Path	Primary Parameters to Configure
"Create a Service Profile for 802.1X Access" on page 61	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand Wireless. **4** Click Wireless Services. **5** Select 802.1X Service Profile in the Task List.	From the Create Service Profile wizard: ▪ Service profile name: edit name ▪ SSID name: enter name ▪ Security mode: select WPA (and deselect Dynamic WEP) ▪ Encryption type: use TKIP (already selected) ▪ EAP Type: use External RADIUS Server (already selected) ▪ RADIUS server group: select one ▪ SSID default VLAN: enter name ▪ Radio profile: select one
"Set Up VLANs on WX Switches" on page 66	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand System. **4** Click VLANs. **5** Select VLAN in the Task List.	From the Create VLAN wizard: ▪ VLAN Name: enter name ▪ VLAN ID: select number ▪ IP Address: enter IP Address ▪ Ports: select them and either move them (use them only in the new VLAN) or add them (share them with other VLANs) ▪ If you add them, select Tag

Step Summary

The following list summarizes the fields selected or configuration items entered in the example that follows to configure Employee access:

1 Create a radio profile.

- From the Radio Profile wizard, enter *RadioProfile1* as the name of the radio profile.
- Click **Finish**.

2 Configure the RADIUS back end:

- Configure the RADIUS server for 802.1X. Use the recommended EAP method, PEAP + MS-CHAPv2.
- Set up each WX switch as a RADIUS client.
- Define any desired 3Com vendor-specific attributes (VSAs).

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- Configure each user record with either the VLAN-Name attribute or the RADIUS Tunnel-Private-Group-ID.
- Configure 802.1X authentication rules.

3 Configure the RADIUS server in 3WXM:

- From the Create RADIUS wizard, enter *sg1* as the Name of the server, the server's IP address, and the Key. Allow the wizard to create the server group and place the server in it for you. Click **Finish**.

4 Create a service profile for 802.1X service.

- From the 802.1x Service Profile wizard, click **Next** and enter *Secure-802.1X-Employees* as the Name of the service profile and *Employees* as the SSID.
- Click **Next**. Select WPA and deselect Dynamic WEP.
- Click **Next**. Leave TKIP enabled.
- Click **Next**. Leave External RADIUS Server enabled. Select the RADIUS server group and click **Add**.
- Click **Next**. Enter *vlan-mkt* as the default VLAN to use if the VLAN is not assigned by RADIUS authorization.
- Click **Next**. Select *RadioProfile1* and click **Add**. Select *default* and click **Remove**.
- Click **Finish**.

5 Set up a VLAN on the WX switches.

- From the Create VLAN wizard, enter *vlan-mkt* as the VLAN name.
- Click **Next**. Select the VLAN ports. Click **Add** to share them with other VLANs or **Move** to use them exclusively in this VLAN. If you click **Add**, then select Tag.
- Click **Finish**.

Example: Configure Employee Access

The following detailed steps provide an example of how to configure Employee services. You will:

- "Create a Radio Profile" on page 56
- "Configure RADIUS Servers" on page 58
- "Create a Service Profile for 802.1X Access" on page 61
- "Set Up VLANs on WX Switches" on page 66

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In general, these same steps are required to configure other services, too. You can refer back to this section, using the summary list or the task table, with configuration options for "Configure Guest Access Services" on page 69 or "Configure Voice over Wireless IP Service" on page 83.

Create a Radio Profile

You configure a radio profile to set attributes that you can apply to multiple radios. Rather than configuring each radio individually, the radio profile is applied to multiple radios that you select. Service profiles are mapped to radio profiles.

The radio profile can contain RF Auto-Tuning settings and IEEE 802.11 settings that control how the data is received and transmitted.

MAPs (and consequently, radios) need to be added to 3WXM after creating a radio profile. For more information about adding radios, refer to one of the following:

- "Using RF Auto-Tuning" on page 97
- "Using RF Auto-Tuning with Modelling" on page 105
- "Using RF Planning" on page 121

To create a radio profile

1. Select Configuration on the toolbar.
2. In the Organizer panel, expand the WX switch.
3. Expand Wireless, then select Radio Profiles.
4. In the Task List panel, select Radio Profile.

   The Create Radio Profile wizard is displayed.

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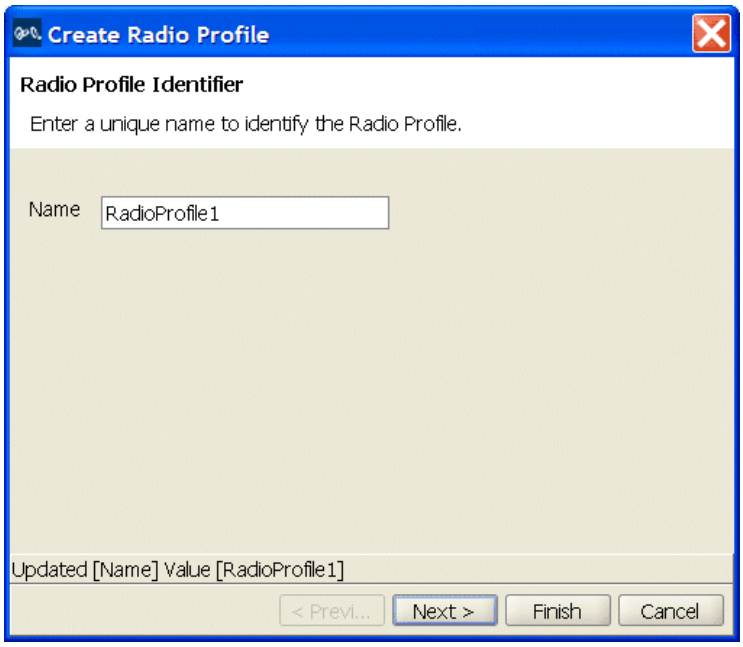


5 Enter the name of the radio profile, then click **Next** at the bottom of the wizard.

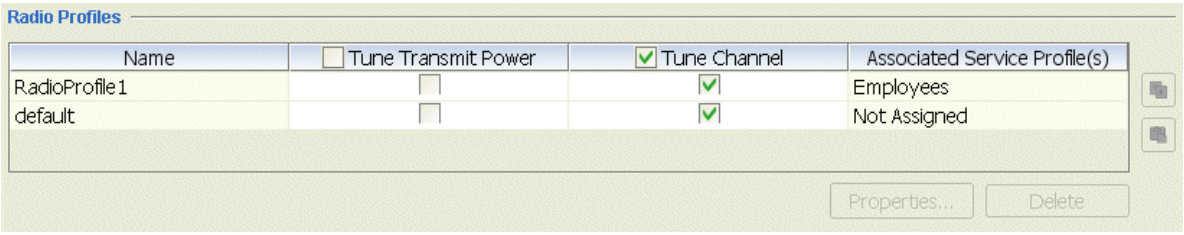
6 If MAPs are already configured, select the radios to map to the radio profile, then click **Move**.

3WXM removes the radios from the radio profile they are in and places them in the new profile.

If you have not configured the MAPs in 3WXM yet, no radios are listed. You can map the radios to the radio profile later.

7 Click **Finish** to save the changes and close the wizard.

The new radio profile appears in the Content panel.



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Configure RADIUS Servers

Remote Authentication Dial-In User Service (RADIUS) is a client-server security protocol that provides authentication, authorization, and accounting for network users and devices. A RADIUS server stores user profiles, which include usernames, passwords, and other user attributes.

To configure RADIUS servers, you must:

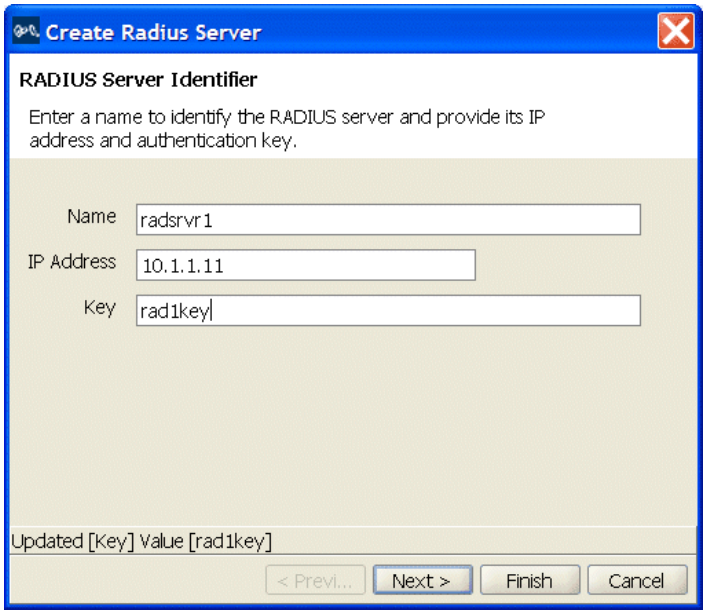
- Configure RADIUS server attributes in 3WXM
- Configure attributes on the RADIUS server

Configure RADIUS Server in 3WXM To configure RADIUS in 3WXM, you define RADIUS server groups (named sets of RADIUS servers). You must create at least one server group. RADIUS server groups can authenticate administrators and network users.

To configure the RADIUS server in 3WXM

1. Select Configuration on the toolbar.
2. In the Organizer panel, expand the WX switch on which you are configuring the service.
3. Expand AAA, then select RADIUS.
4. In the Task List panel, select RADIUS Server.

   The Create RADIUS Server wizard is displayed.



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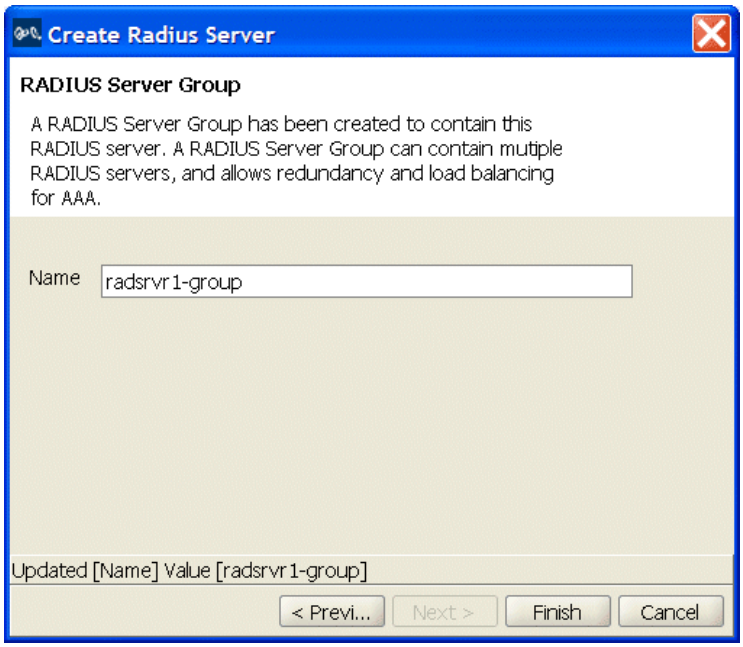
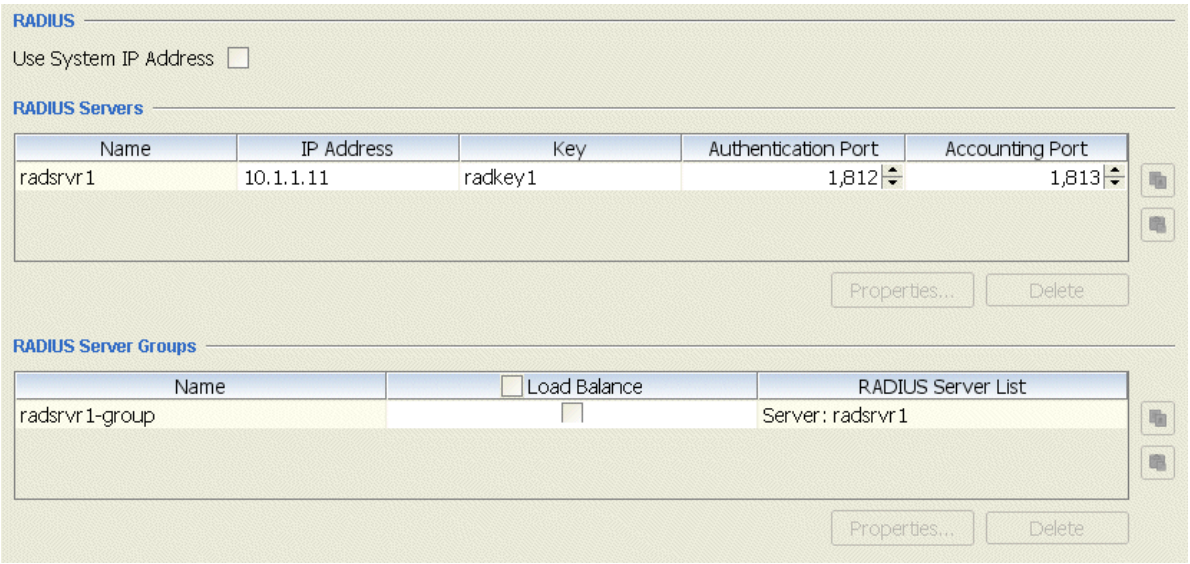
5 Type the name, IP address, and key, then click **Next**.

3WXM suggests the name of a server group to place the server in. The server group is required because AAA rules refer to server groups, not to individual servers.


Create Radius Server
RADIUS Server Group
A RADIUS Server Group has been created to contain this RADIUS server. A RADIUS Server Group can contain mutiple RADIUS servers, and allows redundancy and load balancing for AAA.
Name
radsrvr1-group
Updated [Name] Value [radsrvr1-group]
< Previ...
Next >
Finish
Cancel

6 Click **Finish** to save the server and create the server group.

The new server and group appear in the Content panel.



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Configure Attributes on the RADIUS Server To authenticate users, you will need to configure users either in the local database or on RADIUS servers. To configure services for Employee access, the following items should be configured on the RADIUS server.

To configure the RADIUS server

1. Configure RADIUS server to perform 802.1X using the recommended EAP method PEAP + MSCHAPV2.
2. Setup each WX switch as a RADIUS client.
3. Define any desired 3Com vendor-specific attributes (VSAs) in the RADIUS server's dictionary.

   The vendor-specific attributes (VSAs) created by 3Com are embedded according to the procedure recommended in RFC 2865, with Vendor-ID set to 14525. Table 10 describes the 3Com VSAs, listed in order by vendor type number.

Table 10 3Com VSAs

Attribute	Type	Rcv in Access Resp?	Sent in Access Reqst?	Sent in Acct Reqst?	Description
VLAN-Name	26, 43, 2	Yes	No	Yes	Name of the VLAN to which the client belongs.
Mobility-Profile	26, 43, 3	Yes	No	No	Name of the Mobility Profile used by the authorized client.
Encryption-Type	26, 43, 4	Yes	No	No	Type of encryption used to authenticate the client.
Time-Of-Day	26, 43, 5	Yes	No	No	Day(s) and time(s) during which a user can log into the network.
SSID	26, 43, 6	Yes	No	Yes	Name of the SSID you want the user to use. The SSID must be configured in a service profile, and the service profile must be used by a radio profile assigned to 3Com radios in the Mobility Domain.

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Table 10 3Com VSAs (continued)

Attribute	Type	Rcv in Access Resp?	Sent in Access Reqst?	Sent in Acct Reqst?	Description
End-Date	26, 43, 7	Yes	No	No	Date and time after which the user is no longer allowed to be on the network. Use the following format: YY/MM/DD-HH:MM
Start-Date	26, 43, 7	Yes	No	No	Date and time at which the user becomes eligible to access the network. Use the following format: YY/MM/DD-HH:MM
URL	26, 43, 8	Yes	No	No	URL to which the user is redirected after successful WebAAA. Use the following format: http://www.example.com

4 Configure each user record with authorization rules (username and password) and with either the Vlan-Name attribute (3Com VSA) or the RADIUS Tunnel-Private-Group-ID to assign users to VLANs.

Other attributes are optional.

Create a Service Profile for 802.1X Access

A service profile contains the configuration for the service you want to offer, such as employee access, guest access, or VoWIP.

For more information about service profiles, see "Wireless Configuration" on page 36. For more information about service sets, see "Which Services To Provide?" on page 30.

To create an 802.1X service profile

1 Select Configuration on the toolbar.

2 In the Organizer panel, expand the WX switch.

3 Expand Wireless, then select Wireless Services.

4 In the Task List panel, select 802.1X Service Profile.

The 802.1X Service Profile wizard is displayed.

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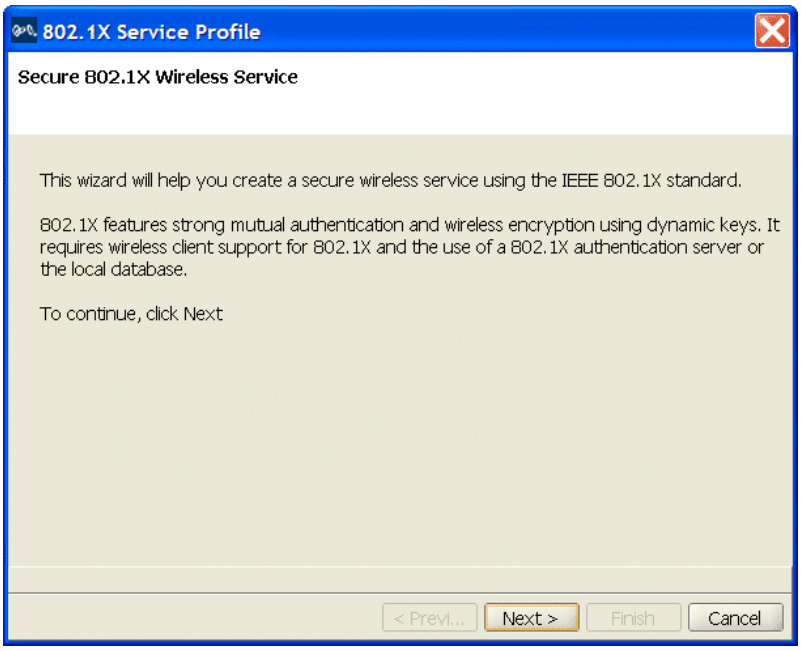
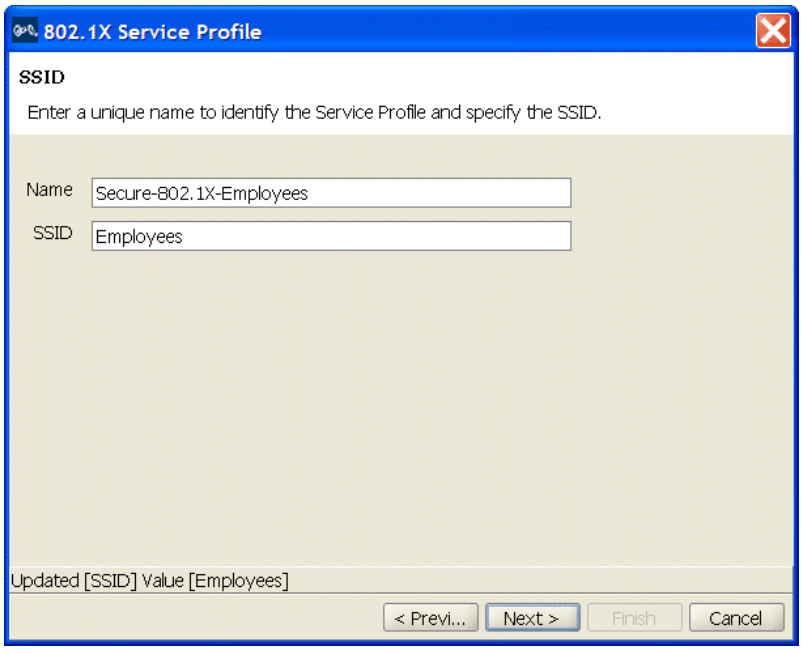

802.1X Service Profile
Secure 802.1X Wireless Service
This wizard will help you create a secure wireless service using the IEEE 802.1X standard.
802.1X features strong mutual authentication and wireless encryption using dynamic keys. It requires wireless client support for 802.1X and the use of a 802.1X authentication server or the local database.
To continue, click Next
< Previ...
Next >
Finish
Cancel

5 Click **Next**.

6 Change the service profile name to *Secure-802.1X-Employees*, and use *Employees* as the SSID, as shown in the figure on the next page.



7 Click **Next**. Select WPA and deselect Dynamic WEP.

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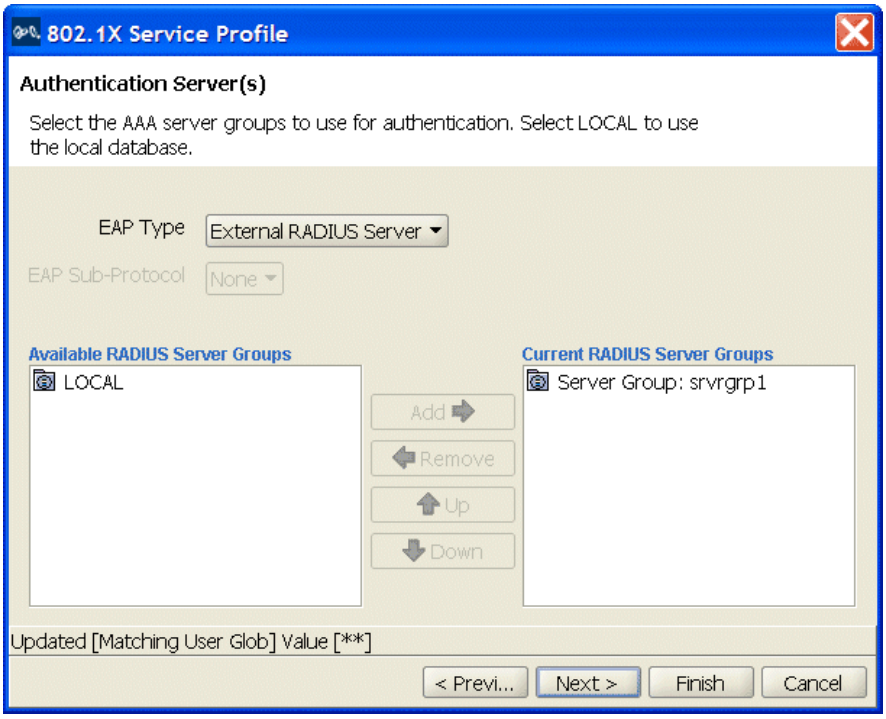
8 Click **Next**. TKIP is already selected.

9 Click **Next**. Leave External RADIUS Server selected as the EAP Type.

10 Select the RADIUS server group in the Available RADIUS Server Groups list and click **Add**.



11 Click **Next**. Type *vlan-mkt* in the VLAN Name box.

12 Click **Next**. Select *RadioProfile1* in the Available Radio Profiles list and click **Add**. Select *default* in the Current Radio Profiles list and click **Remove**.

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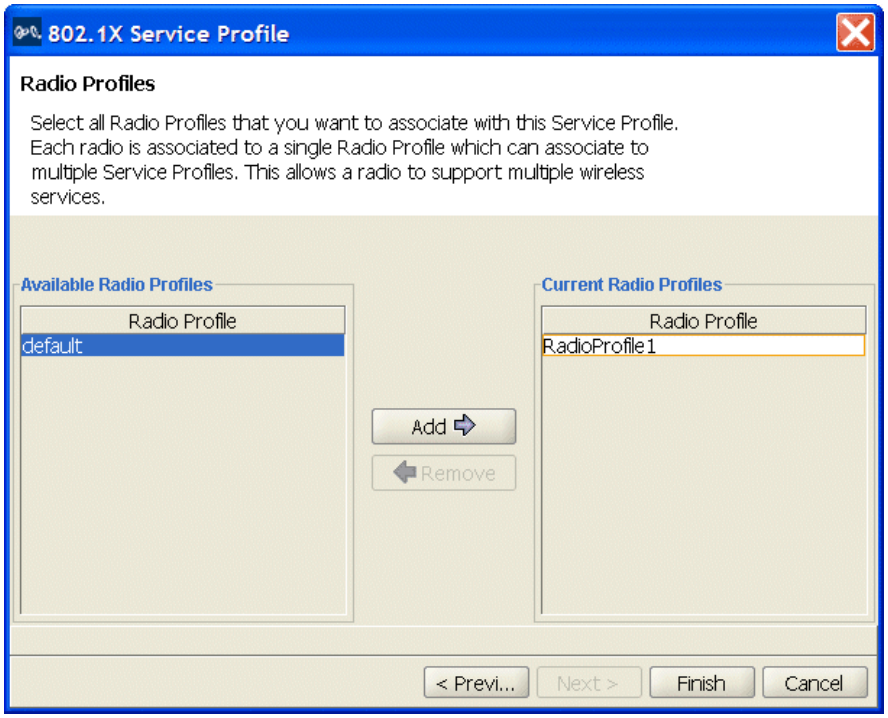
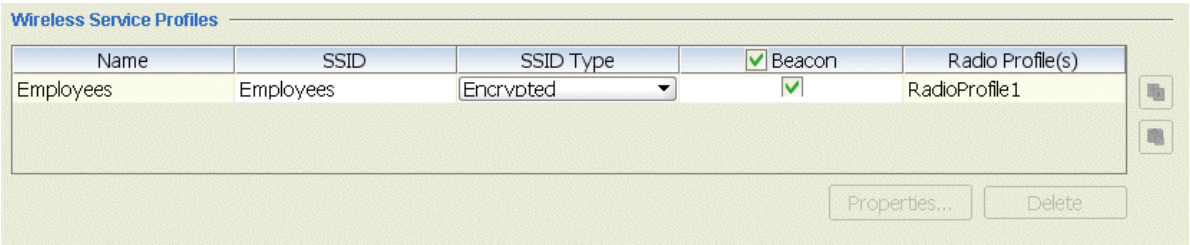

802.1X Service Profile
Radio Profiles
Select all Radio Profiles that you want to associate with this Service Profile. Each radio is associated to a single Radio Profile which can associate to multiple Service Profiles. This allows a radio to support multiple wireless services.
Available Radio Profiles
Radio Profile
default
Add
Remove
Current Radio Profiles
Radio Profile
RadioProfile1
< Previ...
Next >
Finish
Cancel

13 Click **Finish**.

The new service profile appears in the Content panel.



View the Service Profile's Access Rules

Every service profile requires access rules. The access rules specify the usernames or MAC addresses that are allowed to access the SSID. The service profile wizards automatically create access rules that match on all usernames (or that match on all MAC addresses, for VoWIP services).

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To view an 802.1X service profile's access rules

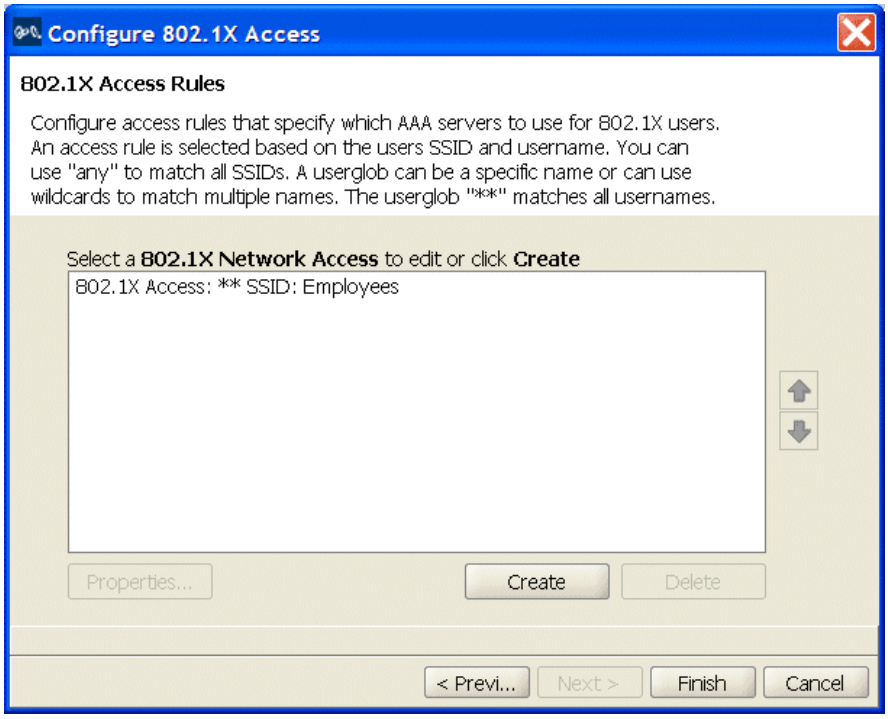
1 Select the service profile in the Wireless Service Profiles table (located in the Content panel).

A Setup group appears in the Task List panel.

2 In the Task List panel, select 802.1X Access.

The Configure 802.1X Access wizard appears. The wizard displays the encryption settings, access rules, and AAA settings for the service profile and allows you to change them. You also can configure new access rules using the wizard.

3 Click **Next** to page through the wizard until the 802.1X Access Rules page appears.


Configure 802.1X Access
802.1X Access Rules
Configure access rules that specify which AAA servers to use for 802.1X users. An access rule is selected based on the users SSID and username. You can use "any" to match all SSIDs. A userglob can be a specific name or can use wildcards to match multiple names. The userglob "**" matches all usernames.
Select a 802.1X Network Access to edit or click Create
802.1X Access: ** SSID: Employees
Properties...
Create
Delete
< Previ...
Next >
Finish
Cancel

This page lists the access rules configured for the service profile. The userglob and SSID name are shown. The userglob is the value that matches on username. The userglob can be a specific username, part of a username with a wildcard character (*), or two wildcard characters (**) to match on all usernames.

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The 802.1X Service Profile wizards uses the ** userglob in the access rule. You can use this rule, modify it, or delete it and create a new one. You also can create additional rules. For syntax information, see the "Wireless Service Parameters" section in the "Configuring Wireless Parameters" chapter of the *Wireless LAN Switch Manager Reference Manual*.

To modify or create access rules

See the "Modifying SSID Encryption Settings and Access Rules" section in the "Configuring Wireless Parameters" chapter of the *Wireless LAN Switch Manager Reference Manual*.

Set Up VLANs on WX Switches

WX switches in a Mobility Domain contain a user's traffic within the VLAN the user is assigned to. For example, if you assign a user to VLAN red, the WX switches in the Mobility Domain contain the user's traffic within VLAN red configured on the switches. The VLANs you set up for service sets support wireless users—they don't serve as management VLANs.

If a WX is connected to the network by only one IP subnet, the WX must have at least one VLAN configured. Optionally, each VLAN can have its own IP address. However, no two IP addresses on the switch can belong to the same IP subnet. User VLANs must be defined on at least one WX switch within the Mobility Domain.

You can configure the Spanning Tree Protocol (STP) on a VLAN. STP is used to maintain a loop-free network; meaning, devices will recognize a loop in the topology and block one or more redundant paths, creating a loop-free path.

The Mobility System Software (MSS) supports Per-VLAN Spanning Tree protocol (PVST). PVST allows a separate spanning tree in each VLAN. STP, disabled by default on all VLANS, is configurable for individual VLANs. STP does not run on MAP ports or wired authentication ports and does not affect traffic flow on these port types.

To set up a VLAN on a WX switch

1. Select Configuration on the toolbar.
2. In the Organizer panel, expand the WX switch.
3. Expand System, then select VLANs.

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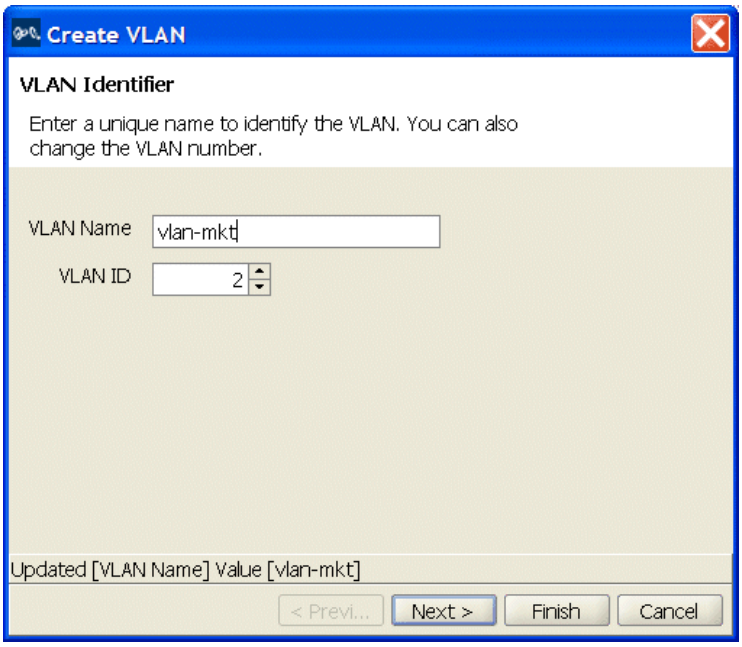
4 In the Task List panel, select VLAN.

The Create VLAN wizard is displayed.



5 Enter *vlan-mkt* as the VLAN name and use the VLAN ID suggested by the wizard.

6 Click **Next**. Select the ports you want to use in the VLAN and click **Add** or **Move**.

- The **Add** button adds the ports to the new VLAN without removing them from any other VLANs.
- The **Move** button removes the ports from all other VLANs, and places them in the new VLAN.

  The ports appear in the Current Members list.

To tag ports in the VLAN, select Tag and edit the tag value. (Tagging is required if you click **Add**, because the ports are then members of multiple VLANs.)

7 Click **Next**. (Optional) To assign an IP interface to the VLAN, edit the IP address or select DHCP Client. To enable the IP interface, select Interface Enabled.

8 Click **Finish**.

The new VLAN appears in the Content panel.

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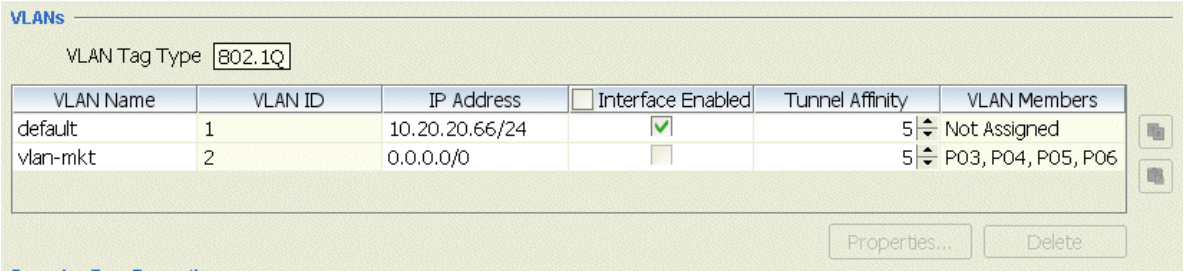

What's Next?

After you create Employee services, you can create additional services.

For information about configuring additional services, refer to:

- "Configure Guest Access Services" on page 69
- "Configure Voice over Wireless IP Service" on page 83

After you have created additional services, you can create your RF environment, and deploy your configuration and enable monitoring.

For information about creating your RF environment, refer to:

- "Using RF Auto-Tuning" on page 97
- "Using RF Auto-Tuning with Modelling" on page 105
- "Using RF Planning" on page 121

For information about deploying your configuration and enabling monitoring of your network, see "Managing and Monitoring Your Network" on page 155.

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Configure Guest Access Services

Guest access is access for visitors at your location and is typically clear (no encryption).

This section contains the following information about how to configure Guest access services:

- "Task Table" on page 69
- "Step Summary" on page 71
- "Optional: Configure Mobility Profiles" on page 81

Table 11 contains the tasks you must perform to configure Guest access services. The "Step Summary" provides the configurable options you should set. The table contains references to the section "Example: Configure Employee Access" on page 55. The references are provided in case you want to refer back to detailed steps. However, be sure to use the configurable options for Guest access services set forth in the "Step Summary" on page 71. Also, you can optionally configure mobility profiles for your Guest access services to limit access based on criteria, such as RF coverage area or time of day.

Task Table

Table 11 contains the tasks you need to perform to create Guest access services. For a summary of configurable items, see "Step Summary" on page 71.

Table 11 Creating a Service for Guest Access

Task	Path	Primary Parameters to Configure
"Create a Radio Profile" on page 56	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand Wireless. **4** Click Radio Profiles. **5** Select Radio Profile in the Task List.	From the Create Radio Profile wizard: ▪ Radio profile name: enter a name After you create the service profile, you can map it to the radio profile. After you install the MAPs, you can map their radios to the radio profile. **Note:** The examples in this chapter configure the radio profile first. However, you also can configure the radio profile later as part of service profile configuration.

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Table 11 Creating a Service for Guest Access

Task	Path	Primary Parameters to Configure
"Create a User Group and Guest Users" on page 72	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand AAA. **4** Click Local User Database. **5** Select User in the Task List.	From the Create Named User wizard: ▪ Username: enter name ▪ Password: enter password ▪ Authorization attributes: configure the end-date, to specify when the account expires
"Create a Service Profile for Guest Access with Web Login" on page 75	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand Wireless. **4** Click Wireless Services. **5** Select Web Portal Service Profile in the Task List.	From the Create Service Profile wizard: ▪ Service profile name: edit name ▪ SSID name: enter name ▪ SSID Type: use Clear (unencrypted) ▪ VLAN Name: enter name ▪ Authentication server: select LOCAL or a RADIUS server group ▪ Radio profile: select one
"Set Up VLANs on WX Switches" on page 66	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand System. **4** Click VLANs. **5** Select VLAN in the Task List.	From the Create VLAN wizard: ▪ VLAN Name: enter name ▪ VLAN ID: select number ▪ IP Address: enter IP Address ▪ Ports: select them and either move them (use them only in the new VLAN) or add them (share them with other VLANs) ▪ If you add them, select Tag
"Optional: Configure Mobility Profiles" on page 81	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand AAA. **4** Click Mobility Profiles. **5** Select Mobility Profile in the Task List.	From the Create Mobility Profile wizard: ▪ Profile Name: enter one ▪ Ports: use Selected ▪ Select the ports or Distributed MAPs

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Step Summary The following list summarizes the fields selected or configuration items entered configure Guest access.

1 Create a radio profile.

- From the Radio Profile wizard, enter *RadioProfile1* as the Name of the radio profile.
- Click **Finish**.

2 Configure users in the local database:

- From the Create Named User wizard, enter *guest1* as username and *guest1pass* as the password.
- Configure the end-date authorization attribute to specify when the account expires.
- Allow the wizard to create a server group or select a configured server group.
- Click **Finish**.

3 Create a Web-Portal service profile.

- From the Web-Portal Service Profile wizard, click **Next** and enter *Web-Portal-Guests* as the Name of the service profile and *Guests* as the SSID.
- Click **Next**. Enter *guest_vlan*.
- Click **Next**. Click **Next** again. Select LOCAL and click **Add**.
- Click **Next**. Click **Next** again. Select *RadioProfile1* and click **Add**. Select *default* and click **Remove**.
- Click **Finish**.

4 Set up a VLAN on the WX switches.

- From the Create VLAN wizard, enter *guest-vlan* as the VLAN name.
- Click **Next**. Select the VLAN ports. Click **Add** to share them with other VLANs or **Move** to use them exclusively in this VLAN. If you click **Add**, then select Tag.
- Click **Finish**.

5 Optional: Configure a Mobility Profile.

- From the Create Mobility Profile wizard, enter the Profile Name.
- Select **Selected**.

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- Choose the Ports or Distributed MAPs to which you'll restrict guest users to certain geographic areas of your network.
- Click **Finish**.

For detailed information about the steps, see the cross-references in the "Task Table" on page 69. New configuration items that were not part of the example "Configure Employee Access Services" on page 52 are included in the following sections.

Create a User Group and Guest Users

A simple way to administer guest user accounts is to configure a guest user group and add users to the group.

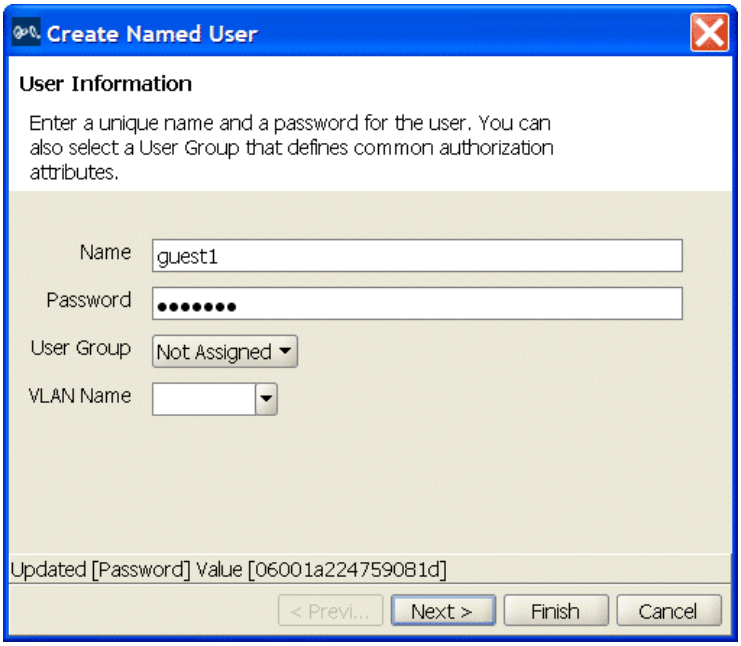
To create users

1 Select Configuration on the toolbar.

2 In the Organizer panel, expand the WX switch.

3 Expand AAA, then select Local User Database.

4 In the Task List panel, select User.



5 Type the username and password.

Leave the User Group unassigned. (You can add the user to the group when you create the group.)

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Leave the VLAN name unassigned.

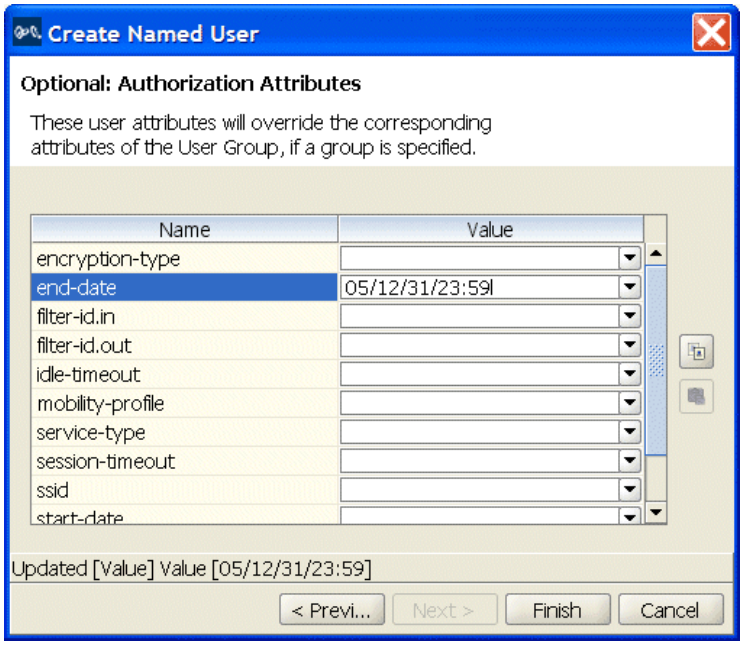
For Web Portal access, you specify the VLAN name when you configure the guest service profile. (See step 8 on page 77.)

6 Click **Next**.

The wizard lists the authorization attributes you can configure for the user. A very useful authorization attribute for guest users is the end-date, which specifies the date and time when the user's network access expires.

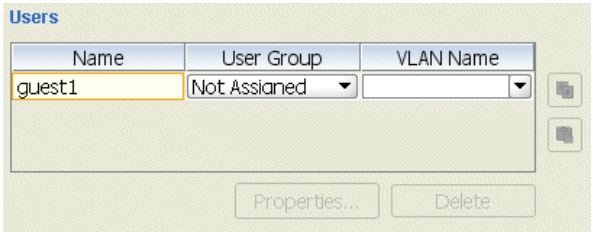
7 Click in the Value column next to end-date and specify the ending date and time for this user's guest access. Use the following format:

`YY/MM/DD-HH:MM`



8 Click **Finish**.

The new user appears in the Content panel.



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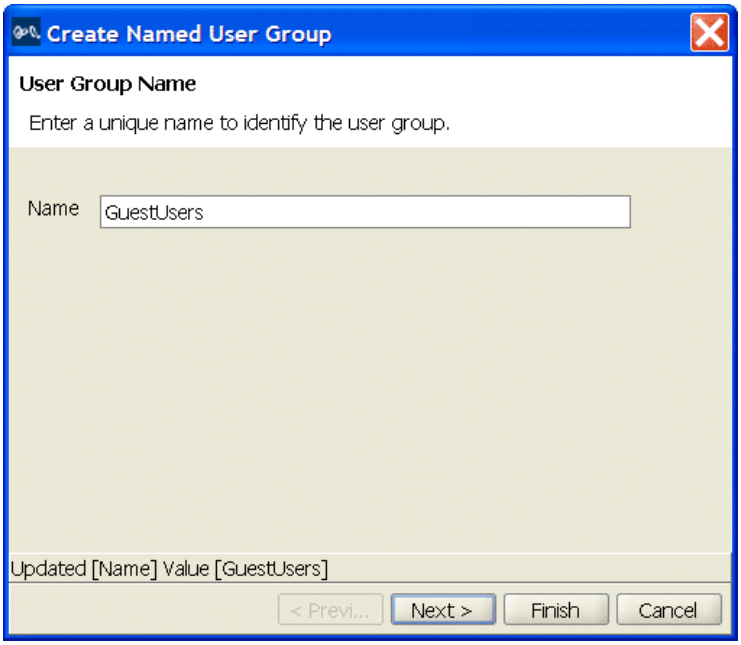
To create a user group and add users to it

1 In the Task List panel, select User Group.



2 Type a name for the group in the name box and click **Next**.

The wizard lists the authorization attributes you can configure for the group. For this example, leave the attributes unconfigured.

If attributes are configured for a user and also for the group the user is in, the attributes assigned to the individual user take precedence for that user.

3 Click **Next**. The users configured in the local database are listed. Select the guest users in the Available Users list and click **Add**.

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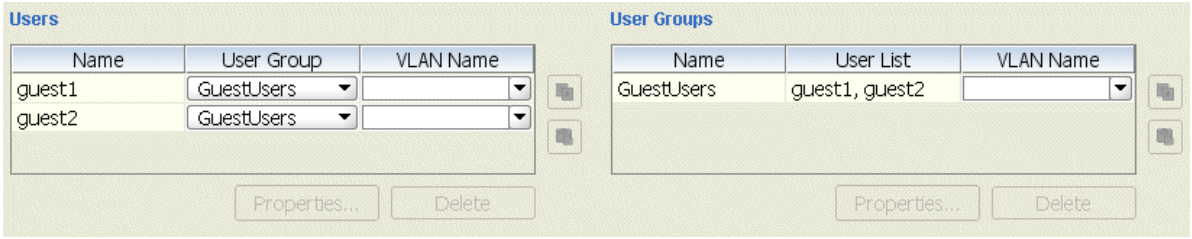
4 Click **Finish**.

The new group appears in the Content panel.



Create a Service Profile for Guest Access with Web Login

To create a Web-Portal service profile

1 Select **Configuration** on the toolbar.

2 In the Organizer panel, expand the WX switch.

3 Expand Wireless, then select **Wireless Services**.

4 In the Task List panel, select **Web-Portal Service Profile**.

The Web-Portal Service Profile wizard is displayed.

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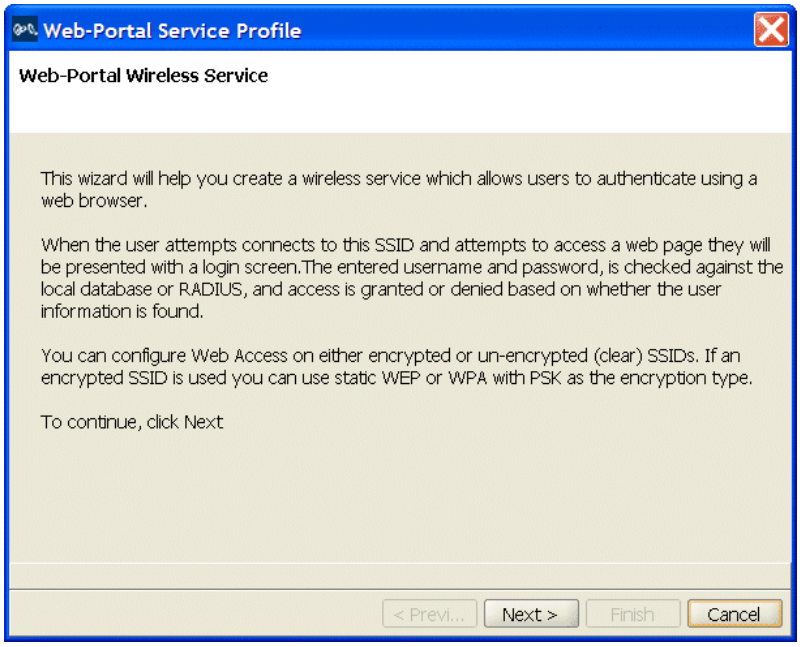
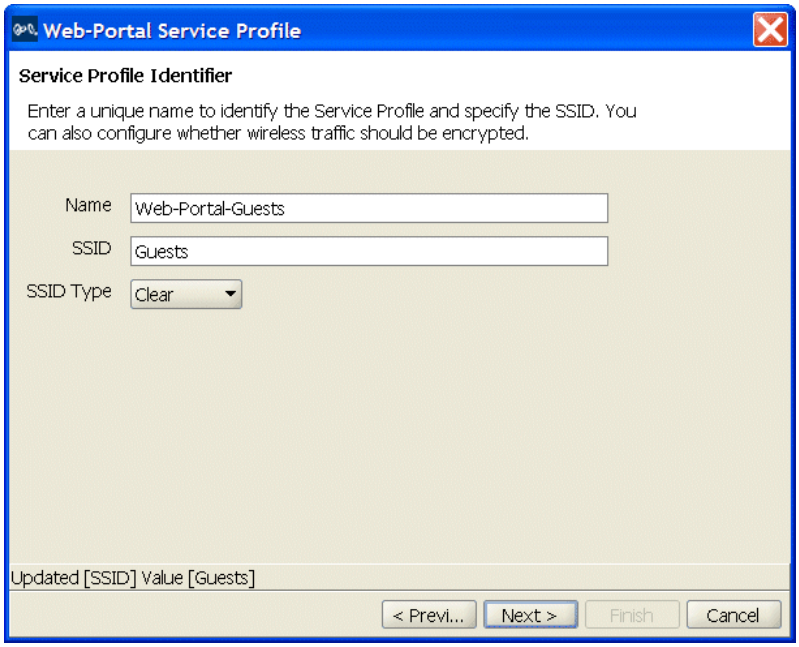

Web-Portal Service Profile
Web-Portal Wireless Service
This wizard will help you create a wireless service which allows users to authenticate using a web browser.
When the user attempts connects to this SSID and attempts to access a web page they will be presented with a login screen.The entered username and password, is checked against the local database or RADIUS, and access is granted or denied based on whether the user information is found.
You can configure Web Access on either encrypted or un-encrypted (clear) SSIDs. If an encrypted SSID is used you can use static WEP or WPA with PSK as the encryption type.
To continue, click Next
< Previ...
Next >
Finish
Cancel

5 Click **Next**.

6 Change the service profile name to *Web-Portal-Guests*, and use the name *Guests* for the SSID.



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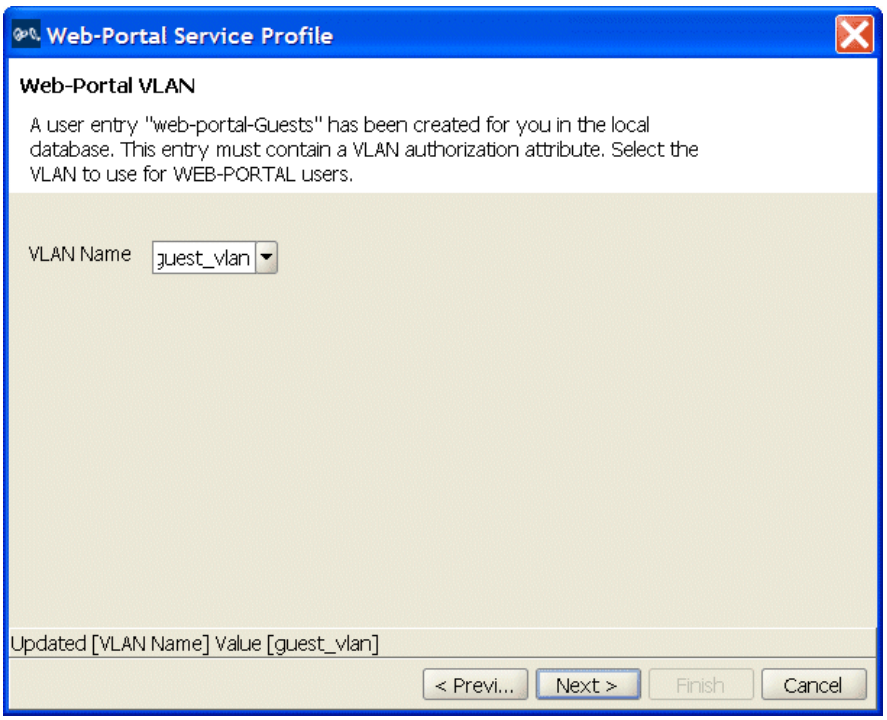
7 Select the SSID Type:

- Clear —Data is not encrypted
- Encrypted—Data is encrypted

For this example, Clear is selected.

8 Click **Next**. Type or select the name of the VLAN you want to place your guests users in. For this example, use *guest-vlan*.

Typing the VLAN name here does not actually configure the VLAN. To configure a VLAN, see "Set Up VLANs on WX Switches" on page 66.


Web-Portal Service Profile
Web-Portal VLAN
A user entry "web-portal-Guests" has been created for you in the local database. This entry must contain a VLAN authorization attribute. Select the VLAN to use for WEB-PORTAL users.
VLAN Name
guest_vlan
Updated [VLAN Name] Value [guest_vlan]
< Previ...
Next >
Finish
Cancel

9 Click **Next**. The wizard displays the ACL that will automatically be added to the configuration by the wizard. The ACL restricts users to DHCP traffic only, while they are in the portal and are being authenticated. After successful authentication, the user is allowed through the portal and the ACL no longer applies to the user session.

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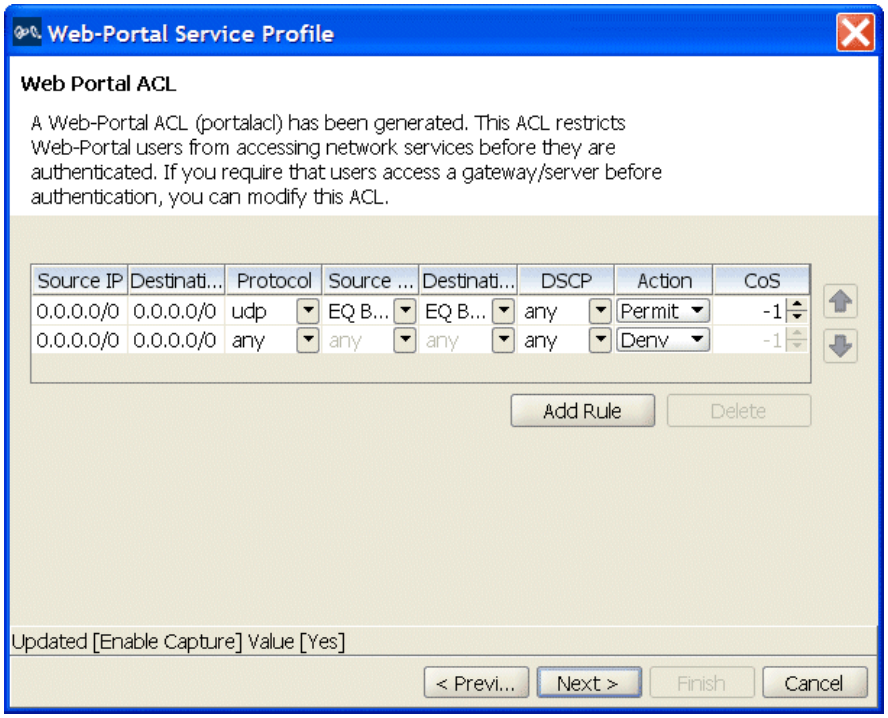

10 Click **Next**. Select the location of the user information and click **Add**:

- LOCAL—The switch's local database
- RADIUS server group—group of external RADIUS servers

(For a server group to be available in the wizard, the group must already be configured. See "Configure RADIUS Servers" on page 58.)

For this example, LOCAL is selected.

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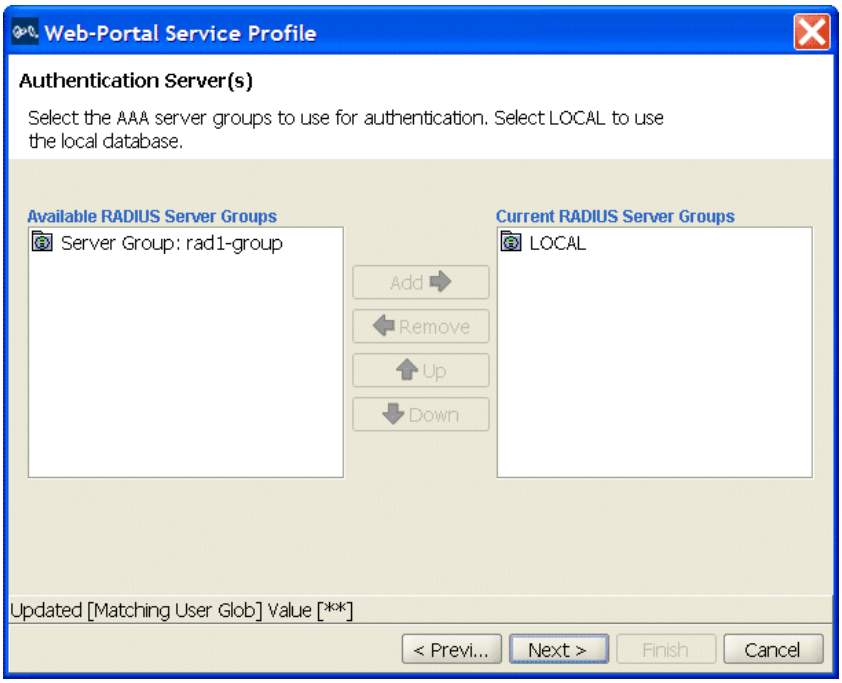
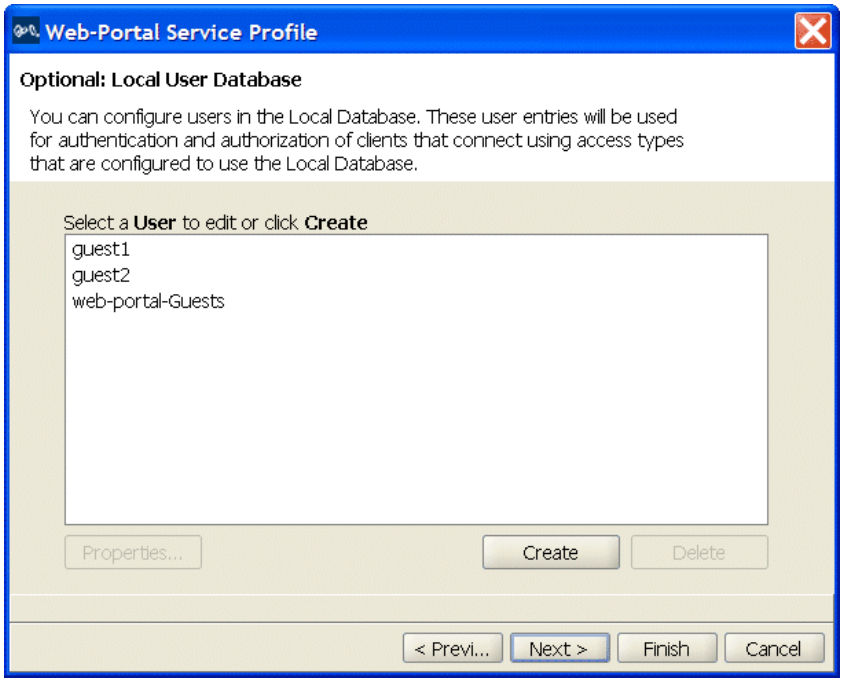


11 Click **Next**. The wizard shows the user names configured in the local database.


Web-Portal Service Profile
Optional: Local User Database
You can configure users in the Local Database. These user entries will be used for authentication and authorization of clients that connect using access types that are configured to use the Local Database.
Select a User to edit or click Create
guest1
guest2
web-portal-Guests
Properties...
Create
Delete
< Previ...
Next >
Finish
Cancel

The users created in "To create users" on page 72 are listed.

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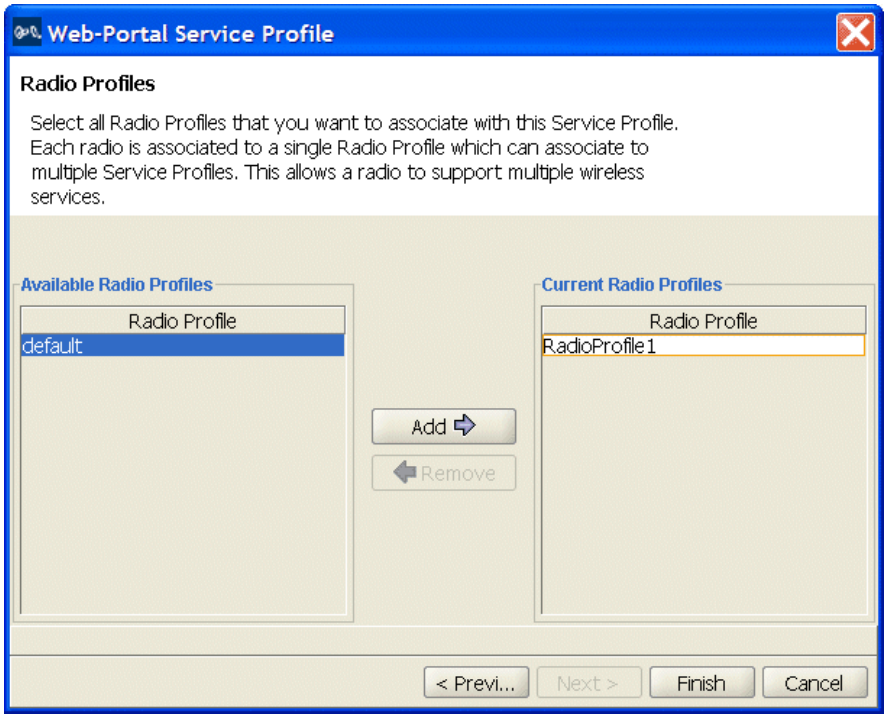
Also listed is a user named *web-portal-**ssid***, where ***ssid*** is the Web-Portal SSID name. This user is automatically created. The switch uses the *web-portal-**ssid*** username for users while they are in the portal and are being authenticated. After a user is authenticated, the username of the session changes to the user's login name.

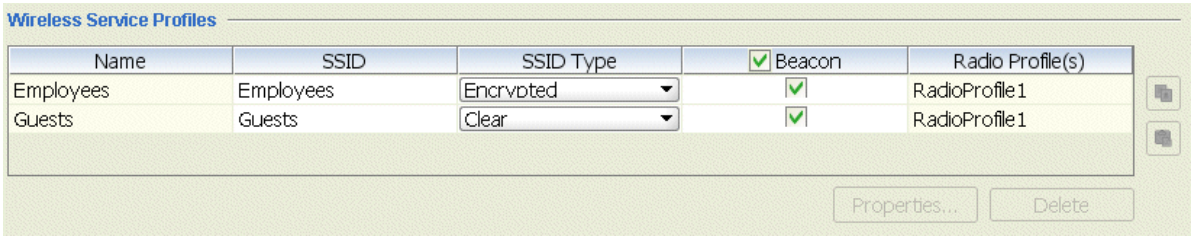
If you need to add users, you can do so from within the wizard by clicking **Create**.

12 Click **Next**. Select *RadioProfile1* in the Available Radio Profiles list and click **Add**. Select the default radio profile and click **Remove**.


Web-Portal Service Profile
Radio Profiles
Select all Radio Profiles that you want to associate with this Service Profile. Each radio is associated to a single Radio Profile which can associate to multiple Service Profiles. This allows a radio to support multiple wireless services.
Available Radio Profiles
Radio Profile
default
Add
Remove
Current Radio Profiles
Radio Profile
RadioProfile1
< Previ...
Next >
Finish
Cancel

13 Click **Finish**.

The new service profile appears in the Content panel.



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View the Service Profile's Access Rules

To view a Web-Portal service profile's access rules

1. Select the service profile in the Wireless Service Profiles table (located in the Content panel).

   A Setup group appears in the Task List panel.

2. In the Task List panel, select Web Portal Access.

   The Configure 802.1X Access wizard appears. The wizard displays the encryption settings, access rules, and AAA settings for the service profile and allows you to change them. You also can configure new access rules using the wizard.

   The wizard is similar to the 802.1X Access wizard, but shows access information for the Web-Portal service profile. (See "View the Service Profile's Access Rules" on page 64.)

Optional: Configure Mobility Profiles

Mobility Profile™ attributes allow or deny access to the network for a specific user or group of users. When you create a Mobility Profile, you specify which MAP ports, Distributed MAPs, or wired authentication ports are to be included. Typically, you include ports that are defined as MAP ports or Distributed MAPs. You can specify that all or no ports are included, or you can specify a list of ports to be included.

When you apply the Mobility Profile, it guests have access only through specific areas of your WLAN—if they roam outside of a designated area supported by a WX switch or certain MAPs, they no longer have access to the Internet.

After creating a Mobility Profile, you can assign it to users created in the local WX user database, or users who are authenticated and authorized by a RADIUS server. To assign it to users in the WX user database, you add the Mobility Profile name when you create or modify a user or user group. To add this on a RADIUS server, you assign the name of the Mobility Profile by using the Mobility-Profile RADIUS attribute, which is a 3Com vendor-specific attribute (VSA).

To create a Mobility Profile

1. Select Configuration on the toolbar.
2. In the Organizer panel, expand the WX switch.
3. Expand AAA, then select Mobility Profiles.

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4 In the Task List panel, select Mobility Profile.

The Create Mobility Profiles wizard appears.

5 In the Profile Name box, type the name of the Mobility Profile.

The name can be up to 16 alphanumeric characters, and it cannot contain tabs.

The Mobility Profile Name has to be defined as an authorization attribute in the defined users or user groups in the local database.

6 In the Ports list, specify ports to include in the Mobility Profile:

- **All**—Include all MAP or wired authentication ports. Go to step 10.
- **Selected**—Include a selected list of ports. Go to the next step.
- **None**—Include no ports. Go to step 10.

7 Select the ports to be included in the Mobility Profile and click **Add**.

8 Click **Next**. In the Distributed MAPs list, specify the Distributed MAPs to include in the Mobility Profile:

- **All**—Include all Distributed MAPs. Go to step 10.
- **Selected**—Include a selected list of Distributed MAPs. Go to the next step.
- **None**—Include no Distributed MAPs. Go to step 10.

9 Select the Distributed MAPs to be included in the Mobility Profile and click **Add**.

10 Click **Finish** to save the changes and close the wizard.

What's Next?

After you create Guest services, you can create another service.

For information about configuring an additional service, refer to:

- "Configure Voice over Wireless IP Service" on page 83

You can create your RF environment, and deploy your configuration and enable monitoring.

For information about creating your RF environment, refer to:

- "Using RF Auto-Tuning" on page 97
- "Using RF Auto-Tuning with Modelling" on page 105
- "Using RF Planning" on page 121

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For information about deploying your configuration and enabling monitoring your network, refer to:

- "Managing and Monitoring Your Network" on page 155.

Configure Voice over Wireless IP Service

Voice over Wireless IP (VoWIP) is a new technology, merging VoIP (Voice over IP) with 802.11 wireless LANs to create a wireless telephone system. Organizations that add VoWIP to their wireless LANs can deploy and manage voice and data over a single wireless backbone, reserving some portion of network bandwidth to support real-time voice communications.

For a VoWIP service (sometimes also referred to simply as *VoIP*, or *Voice over IP*), you can configure either local or RADIUS server authentication, and add Access Lists (ACLs) to restrict user access.

This section contains the following information about how to configure VoWIP services:

- "Task Table" on page 83
- "Step Summary" on page 85
- "Create a Service Profile for WMM VoWIP Devices" on page 87
- "Create a Service Profile for SVP VoWIP Devices" on page 90
- "Create a Service Profile for Avaya VoWIP Devices" on page 92

Table 12 contains the tasks you must perform to configure Guest access services. The table contains references to the section "Example: Configure Employee Access" on page 55. The references are provided in case you want to refer back to detailed steps. However, be sure to use the configurable options for VoWIP access services set forth in the "Step Summary" on page 85. The "Step Summary" provides the configurable options you should set.

Task Table

Table 12 contains the tasks you need to perform to create VoWIP access services. For a summary of configurable items, see "Step Summary" on page 85.

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Table 12 Creating a Service for VoWIP Access

Task	Path	Primary Parameters to Configure
"Create a Radio Profile" on page 56	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand Wireless. **4** Click Radio Profiles. **5** Select Radio Profile in the Task List.	From the Create Radio Profile wizard: ▪ Radio profile name: enter a name For SpectraLink, from the Radio Profile Properties dialog: ▪ 802.11 attributes: change DTIM to 3 After you create the service profile, you can map it to the radio profile. After you install the MAPs, you can map their radios to the radio profile. **Note:** The examples in this chapter configure the radio profile first. However, you also can configure the radio profile later as part of service profile configuration.
"Create a Service Profile for Voice" on page 86	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand Wireless. **4** Click Wireless Services. **5** Select Voice Service Profile in the Task List.	From the Create Service Profile wizard: ▪ Service profile name: edit name ▪ SSID name: enter name ▪ SSID Type: use Clear (unencrypted) ▪ VLAN Name: enter name ▪ Authentication server: select LOCAL ▪ Radio profile: select one
"Set Up a VLAN for VoWIP on WX Switches" on page 94	**1** Tool bar option: select Configuration. **2** Organizer panel: expand the WX switch. **3** Expand System. **4** Click VLANs. **5** Select VLAN in the Task List.	From the Create VLAN wizard: ▪ VLAN Name: enter name ▪ VLAN ID: select number ▪ IP Address: enter IP Address ▪ Ports: select them and move them to the voice VLAN For SpectraLink, from the VLAN Properties dialog: ▪ IGMP: disable SVP requires IGMP snooping to be disabled.

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Step Summary The following list summarizes the fields selected or configuration items entered in the example that follows to configure VoWIP access:

1 Create a radio profile.

- From the Radio Profile wizard, enter *RadioProfileVoic* as the Name of the radio profile.
- Click **Finish**.
- Select the radio profile and click **Properties**.
- Select the 802.11 Attributes and change the DTIM Period to 3.
- Click **OK**.

2 Create a Voice service profile.

- From the Voice Service Profile wizard, click **Next** and enter *Voice-WMM, Voice-SVP, Voice-Avaya*, or *Voice-Vocera* as the Name of the service profile and *WMM*, *SVP*, *Avaya*, or *Vocera* as the SSID.
- Select the Vendor (SpectraLink, Avaya, Vocera, or Other).
- Click **Next**. Select the access type. (The examples in this section use Open Access.)
- Click **Next**. Select the data encryption method. (The examples in this section use WPA and disable Static WEP.)
- Click **Next**. Leave TKIP enabled and click **Next**.
- Click **Next**. Type a passphrase from 8 to 63 characters long in the Pre-shared Key box and click **Generate**.
- Click **Next**. Type *voice-vlan* as the VLAN name to place voice users in.
- Click **Next**. (If the device supports WMM, select **WMM**.)
- Click **Next**. Select *RadioProfileVoic* in the Radio Profiles list.
- Click **Finish**.

3 Set up a VLAN on the WX switches.

- From the Create VLAN wizard, enter *voice-vlan* as the VLAN name.
- Click **Next**. Select the VLAN ports. Click **Move** to use them exclusively in this VLAN.
- Click **Finish**.
- Select the VLAN and click **Properties**.
- Select IGMP and deselect Enabled to disable IGMP snooping.

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Create a Radio Profile for Voice

This procedure is similar to the procedure in "Create a Radio Profile" on page 56, but has additional steps to change the delivery traffic indication map (DTIM) interval to 3.

To create a radio profile for voice service

1. Select Configuration on the toolbar.
2. In the Organizer panel, expand the WX switch.
3. Expand Wireless, then select Radio Profiles.
4. In the Task List panel, select Radio Profile.
5. The Create Radio Profiles wizard is displayed.
6. Enter the name of the radio profile (for example, *RadioProfileVoic*), then click **Next** at the bottom of the wizard.
7. If MAPs are already configured, select the radios to map to the radio profile, then click **Move**.

   3WXM removes the radios from the radio profile they are in and places them in the new profile.

   If you have not configured the MAPs in 3WXM yet, no radios are listed. You can map the radios to the radio profile later.
8. Click **Finish** to save the changes and close the wizard.

   The new radio profile appears in the Content panel.
9. If you are configuring voice service for SpectraLink devices, do the following:
   - **a** Select the radio profile in the Radio Profiles table and click **Properties**.
   - **b** Click the 802.11 Attributes tab.
   - **c** In the DTIM Period box, change the value to 3.
   - **d** Click **OK**.

Create a Service Profile for Voice

The Voice Service Profile wizard tailors its options based on the vendor you select. The wizard has the following vendor options:

- SpectraLink
- Avaya
- Vocera
- Other

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The SpectraLink, Avaya, and Vocera options configure service for proprietary VoWIP solutions from these vendors. If you are configuring VoWIP for devices that use the Wi-Fi Multimedia (WMM) standard, or a proprietary solution other than one of the listed vendors', use the Other option.

Create a Service Profile for WMM VoWIP Devices

1. Select Configuration on the toolbar.
2. In the Organizer panel, expand the WX switch.
3. Expand Wireless, then select Wireless Services.
4. In the Task List panel, select Voice Service Profile.

   The Voice Service Profile wizard is displayed.
5. Click **Next**.
6. Change the service profile name to *Voice-WMM*, and use the name *WMM* for the SSID.

7. Select Other from the Vendor drop-down list.
8. Click **Next**. Select Open Access and deselect MAC Access.

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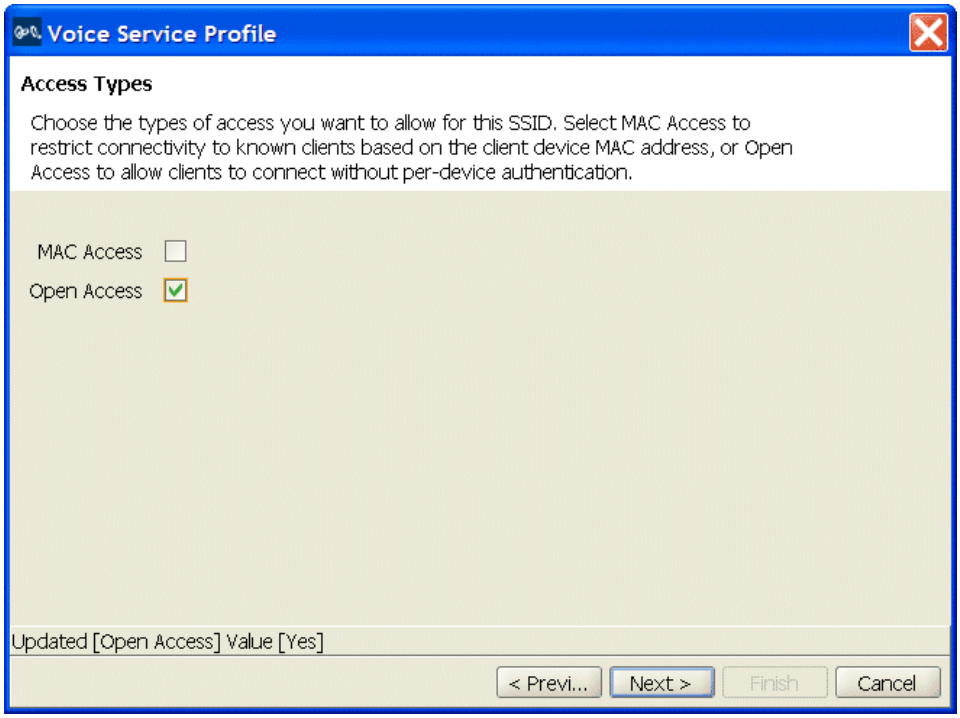
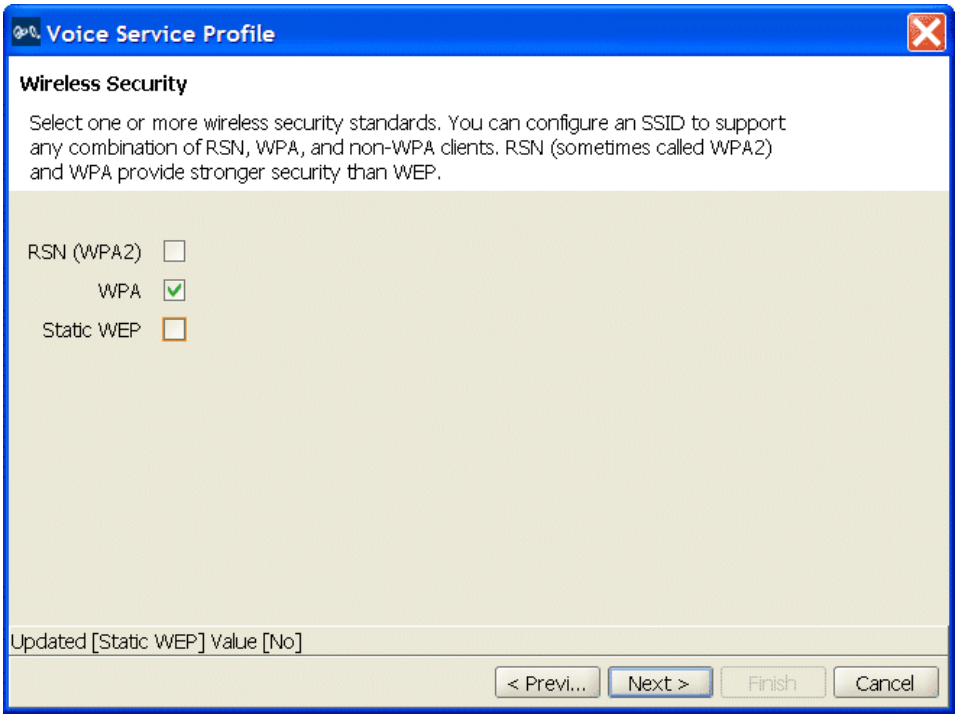

Voice Service Profile
Access Types
Choose the types of access you want to allow for this SSID. Select MAC Access to restrict connectivity to known clients based on the client device MAC address, or Open Access to allow clients to connect without per-device authentication.
MAC Access
Open Access
Updated [Open Access] Value [Yes]
< Previ...
Next >
Finish
Cancel

9 Click **Next**. Select WPA and deselect Static WEP.


Voice Service Profile
Wireless Security
Select one or more wireless security standards. You can configure an SSID to support any combination of RSN, WPA, and non-WPA clients. RSN (sometimes called WPA2) and WPA provide stronger security than WEP.
RSN (WPA2)
WPA
Static WEP
Updated [Static WEP] Value [No]
< Previ...
Next >
Finish
Cancel

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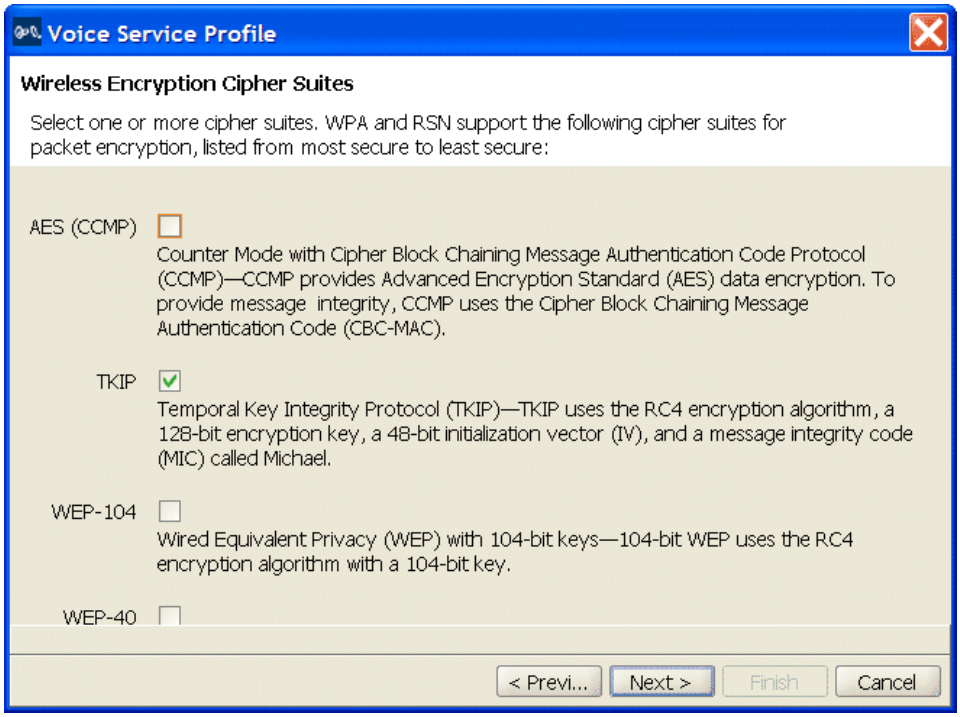
10 Click **Next**. Leave TKIP enabled and click **Next**.


Voice Service Profile
Wireless Encryption Cipher Suites
Select one or more cipher suites. WPA and RSN support the following cipher suites for packet encryption, listed from most secure to least secure:
AES (CCMP)
Counter Mode with Cipher Block Chaining Message Authentication Code Protocol (CCMP)—CCMP provides Advanced Encryption Standard (AES) data encryption. To provide message integrity, CCMP uses the Cipher Block Chaining Message Authentication Code (CBC-MAC).
TKIP
Temporal Key Integrity Protocol (TKIP)—TKIP uses the RC4 encryption algorithm, a 128-bit encryption key, a 48-bit initialization vector (IV), and a message integrity code (MIC) called Michael.
WEP-104
Wired Equivalent Privacy (WEP) with 104-bit keys—104-bit WEP uses the RC4 encryption algorithm with a 104-bit key.
WEP-40
< Previ...
Next >
Finish
Cancel

11 Click **Next**. Type a passphrase from 8 to 63 characters long in the Pre-shared Key box and click **Generate**.

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Voice Service Profile
Pre-shared Key
Enter the pre-shared key to use for client authentication. To generate a key, enter a pass-phrase and click on Generate
Pre-shared Key
17c82652c811791888a95ad49d219acf0255e2784ed6123
Generate
Updated [Pre-shared Key] Value [93931e875d643ae1bd7c82652c811791888a95ad49d219acf0255e2...
< Previ...
Next >
Finish
Cancel

12 Click **Next**. Type or select the name of the VLAN you want to place voice users in. For this example, use *voice-vlan*.

Typing the VLAN name here does not actually configure the VLAN. To configure a VLAN, see "Set Up VLANs on WX Switches" on page 66.

13 Click **Next**. Select Enable **WMM**.

14 Click **Next**. Select *RadioProfileVoic* in the Radio Profiles list.

15 Click **Finish**.

Create a Service Profile for SVP VoWIP Devices

1 Select Configuration on the toolbar.

2 In the Organizer panel, expand the WX switch.

3 Expand Wireless, then select Wireless Services.

4 In the Task List panel, select Voice Service Profile.

The Voice Service Profile wizard is displayed.

5 Click **Next**.

6 Change the service profile name to *Voice-SVP*, and use the name *SVP* for the SSID.

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7 Leave SpectraLink selected in the Vendor drop-down list.

8 Click **Next**. Select Open Access and deselect MAC Access.

9 Click **Next**. Select WPA and deselect Static WEP.

10 Click **Next**. Leave TKIP enabled and click **Next**.

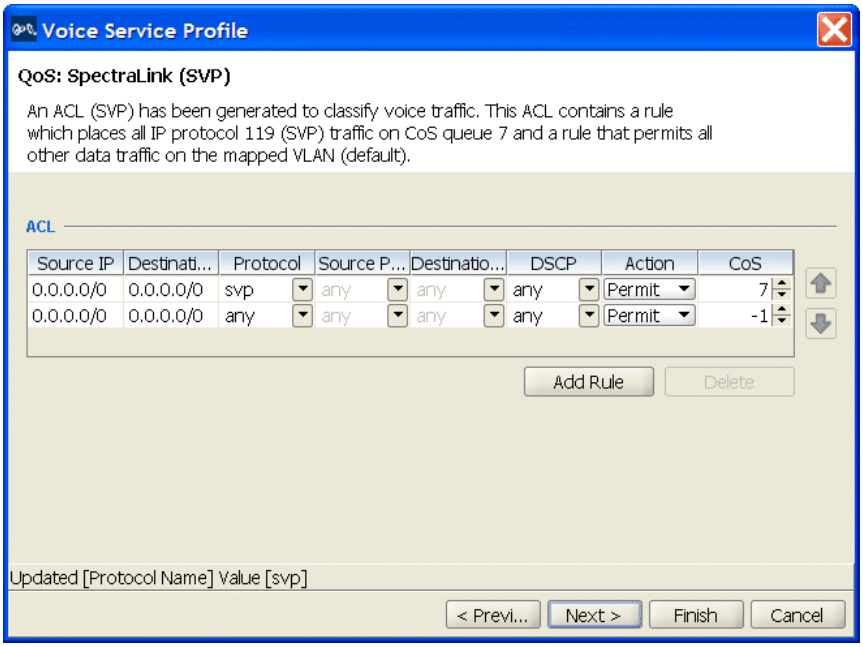
11 Click **Next**. Type a passphrase from 8 to 63 characters long in the Pre-shared Key box and click **Generate**.

12 Click **Next**. Type or select the name of the VLAN you want to place SVP users in. For this example, use *voice-vlan*.

Typing the VLAN name here does not actually configure the VLAN. To configure a VLAN, see "Set Up VLANs on WX Switches" on page 66.

13 Click **Next**.

14 Click **Next**. The wizard displays the ACL that will automatically be added to the configuration by the wizard. The first rule in the ACL provides high -priority treatment of SVP traffic by marking IP protocol 119 (SVP) packets with CoS 7. The second rule permits all other traffic in the VLAN.



15 Click **Next**. Select *RadioProfileVoic* in the Radio Profiles list.

16 Click **Finish**.

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Create a Service Profile for Avaya VoWIP Devices

1. Select Configuration on the toolbar.
2. In the Organizer panel, expand the WX switch.
3. Expand Wireless, then select Wireless Services.
4. In the Task List panel, select Voice Service Profile.

   The Voice Service Profile wizard is displayed.
5. Click **Next**.
6. Change the service profile name to *Voice-Avaya*, and use the name *Avaya* for the SSID.
7. Select Avaya in the Vendor drop-down list.
8. Click **Next**. Select Open Access and deselect MAC Access.
9. Click **Next**. Select WPA and deselect Static WEP.
10. Click **Next**. Leave TKIP enabled and click **Next**.
11. Click **Next**. Type a passphrase from 8 to 63 characters long in the Pre-shared Key box and click **Generate**.
12. Click **Next**. Type or select the name of the VLAN you want to place Avaya users in. For this example, use *voice-vlan*.

Typing the VLAN name here does not actually configure the VLAN. To configure a VLAN, see "Set Up VLANs on WX Switches" on page 66.

13. Click **Next**.
14. Click **Next**. The wizard displays the ACL that will automatically be added to the configuration by the wizard.

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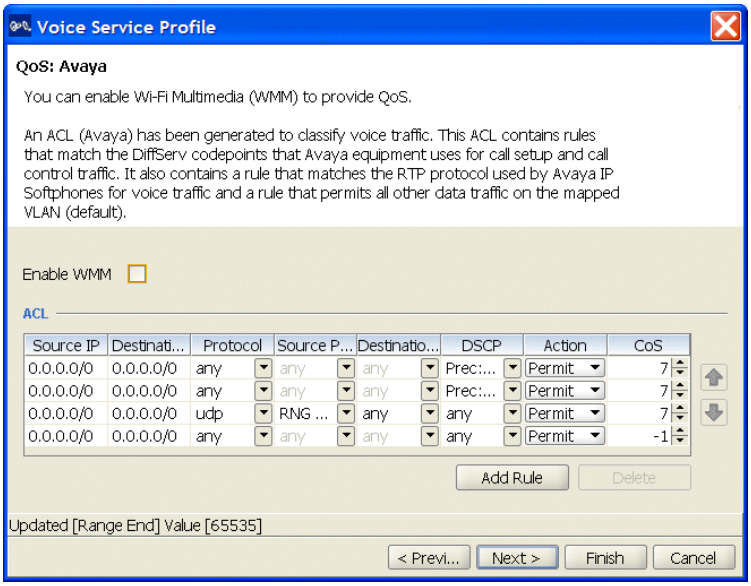
Voice Service Profile
QoS: Avaya
You can enable Wi-Fi Multimedia (WMM) to provide QoS.
An ACL (Avaya) has been generated to classify voice traffic. This ACL contains rules that match the DiffServ codepoints that Avaya equipment uses for call setup and call control traffic. It also contains a rule that matches the RTP protocol used by Avaya IP Softphones for voice traffic and a rule that permits all other data traffic on the mapped VLAN (default).
Enable WMM
ACL
Source IP
Destinati...
Protocol
Source P...
Destinatio...
DSCP
Action
CoS
0.0.0.0/0 0.0.0.0/0 any any any Prec:... Permit 7
0.0.0.0/0 0.0.0.0/0 any any any Prec:... Permit 7
0.0.0.0/0 0.0.0.0/0 udp RNG ... any any Permit 7
0.0.0.0/0 0.0.0.0/0 any any any any Permit -1
Add Rule
Delete
Updated [Range End] Value [65535]
< Previ...
Next >
Finish
Cancel

15 Click **Next**. Select *RadioProfileVoic* in the Radio Profiles list.

16 Click **Finish**.

Create a Service Profile for Vocera VoWIP Devices

1 Select **Configuration** on the toolbar.

2 In the Organizer panel, expand the WX switch.

3 Expand Wireless, then select **Wireless Services**.

4 In the Task List panel, select **Voice Service Profile**.

The Voice Service Profile wizard is displayed.

5 Click **Next**.

6 Change the service profile name to *Voice-Vocera*, and use the name *VoceraBadges* for the SSID.

7 Select **Vocera** in the Vendor drop-down list.

8 Click **Next**. Leave MAC Access selected.

9 Click **Next**. Leave Static WEP selected.

10 Specify the WEP keys.

- For each key (up to four), type the key value in the corresponding key box.
- By default, data in unicast and multicast packets are encrypted using WEP key 1. To use another key for either type of packet, select the key number in the WEP Unicast Key Index or WEP Multicast Key Index box.

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11 Click **Next**. Type or select the name of the VLAN you want to place SVP users in. For this example, use *voice-vlan*.

Typing the VLAN name here does not actually configure the VLAN. To configure a VLAN, see "Set Up VLANs on WX Switches" on page 66.

12 Click **Create** to add MAC users to the switch's local database.

   a In the User MAC Address box, type the MAC address for the user device, using colons (:) as delimiters. You must specify all 6 bytes of the MAC address.

   b In the MAC User Group list, select the MAC user group that the user device belongs to if the group is already configured.

   c In the VLAN Name box, select or type the name of the VLAN that the user device belongs to (1 to 16 alphanumeric characters, with no spaces or tabs). The WX switch will authorize the user for that VLAN. For more information on VLANs, see "Viewing and Configuring VLANs" in the *Wireless LAN Switch Manager Reference Manual*.

   d Click **Next**. In the attribute row you want to configure, click the Attribute Value column. (See the "Authorization Attributes" section in the "Configuring Authentication, Authorization, and Accounting Parameters" chapter of the *Wireless LAN Switch Manager Reference Manual.*)

   e Click **Finish**.

13 Click **Next**. Select *RadioProfileVoic* in the Radio Profiles list.

14 Click **Finish**.

Set Up a VLAN for VoWIP on WX Switches

This procedure is similar to the procedure in "Set Up VLANs on WX Switches" on page 66, except IGMP snooping is disabled on the VLAN.

To set up a VLAN for VoWIP on a WX switch

1 Select Configuration on the toolbar.

2 In the Organizer panel, expand the WX switch.

3 Expand System, then select VLANs.

4 In the Task List panel, select VLAN.

   The Create VLAN wizard is displayed.

5 Enter a name such as *vlan-voice* and use the VLAN ID suggested by the wizard.

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6 Click **Next**. Select the ports you want to use in the VLAN and click **Add** or **Move**.

- The **Add** button adds the ports to the new VLAN without removing them from any other VLANs.
- The **Move** button removes the ports from all other VLANs, and places them in the new VLAN.

The ports appear in the Current Members list.

To tag ports in the VLAN, select Tag and edit the tag value. (Tagging is required if you click **Add**, because the ports are then members of multiple VLANs.)

7 Click **Next**. (Optional) To assign an IP interface to the VLAN, edit the IP address or select DHCP Client. To enable the IP interface, select Interface Enabled.

8 Click **Finish**.

The new VLAN appears in the Content panel.

For SVP, continue with the following steps, to disable IGMP snooping. For VoWIP types that do not require IGMP to be disabled, you can stop here.

9 Select the VLAN in the VLANs table and click **Properties**.

10 Click the IGMP tab.

11 Deselect Enabled, to disable IGMP snooping on the VLAN.

12 Click **OK**.

What's Next?

After you create VoWIP access services, you can create another service.

For information about configuring an additional service, refer to:

- "Configure Guest Access Services" on page 69

You can create your RF environment, and deploy your configuration and enable monitoring.

For information about creating your RF environment, refer to:

- "Using RF Auto-Tuning" on page 97
- "Using RF Auto-Tuning with Modelling" on page 105
- "Using RF Planning" on page 121

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For information about deploying your configuration and enabling monitoring your network, refer to:

- "Managing and Monitoring Your Network" on page 155.

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4 USING RF AUTO-TUNING

What Is RF Auto-Tuning?

RF Auto-Tuning is a technique you can use to configure your RF (radio) network. RF Auto-Tuning is a quick method that requires minimal configuration and no RF planning or site surveys, and instead, relies on the AutoTune feature to set MAP channels and power settings.

This is a great way to quickly install a WX switch and MAPs, and observe how the network operates. The RF Auto-Tuning technique is best suited to networks containing fewer MAPs.

To learn more about the benefits of RF Auto-Tuning, see "RF Auto-Tuning" on page 32.

To use this technique:

1. Physically place your equipment (WX switches and MAPs) in their desired locations.
2. Configure initial WX switch connectivity (configure IP addresses).
3. Upload the WX switch configuration into a 3WXM network plan.
4. Create a service profile.
5. Create a radio profile (or use the default radio profile).
6. Map your service profile to your radio profile.
7. Create your MAPs.
8. Apply a radio profile to each radio on a MAP.
9. Deploy your configuration.

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Place Your Equipment

You will need to unpack and physically install your WX switches and MAPs. For information about installing your equipment, see "Equipment Installation" on page 42.

Configure Initial WX Switch Connectivity

After installing a WX switch, you must prepare it for configuration and management by 3WXM, by configuring IP connectivity between the WX and 3WXM. Use the Web Quick Start (if available), or enter the **quickstart** command at the CLI prompt.

For more information about configuring initial WX switch connectivity, see the *Wireless LAN Switch and Controller Quick Start Guide*.

An administrative certificate is also required on the WX switch to enable management access by 3WXM. If the switch does not already have certificates, MSS automatically generates them the first time you boot using MSS Version 4.2 or later. You do not need to install certificates unless you want to replace the ones automatically generated by MSS. (For more information, see the "Certificates Automatically Generated by MSS" section in the "Managing Keys and Certificates" chapter of the *Wireless LAN Switch and Controller Configuration Guide*.)

Upload the WX Switch Configuration into a 3WXM Network Plan

Retrieve the basic configuration information you added to the WX switch and upload it into 3WXM.

To upload the WX switch configuration into a 3WXM network plan

1. Select the Configuration tool bar option.
2. In the Task List panel, select Upload Wireless Switch.
3. In the IP Address box, type the IP address for the WX switch.
4. In the Enable Password box, type the enable password for the WX switch.

   This password must match the enable password that was defined using the CLI command **set enablepass**. For more information, see the *Wireless LAN Switch and Controller Configuration Guide*.
5. Click **Next**. The uploading progress is shown.
6. After the *Successfully uploaded device* message is displayed, click **Next**.

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3WXM uses its verification rules to check the switch's configuration. If an item in the configuration generates an error or warning, 3WXM displays the error or warning message.

7 Review the verification messages to determine whether you will need to make changes to the switch's configuration after uploading it into 3WXM.

8 Click **Next**.

9 Click **Finish**.

10 If 3WXM displayed error or warning messages, select the Verification tool bar option. (See the "Verifying Configuration Changes" chapter in the *Wireless LAN Switch Manager Reference Manual*.)

Create a Service Profile

A service profile contains the configuration for the service you want to offer, such as employee access, guest access, or multi-hosted access.

For more information about service profiles, see "Wireless Configuration" on page 36. For more information about wireless services, see "Which Services To Provide?" on page 30.

To create a service profile

1 Select the Configuration tool bar option.

2 In the Organizer panel, click the plus sign next to the WX switch.

3 Click the plus sign next to Wireless.

4 Select Wireless Services.

5 In the Task List panel, select one of the following:

- 802.1X Service Profile—Provides wireless access to 802.1X clients.
- Voice Service Profile—Provides wireless access to Voice over IP (VoIP) devices.
- Web-Portal Service Profile—Provides wireless access to clients who log in using a web page.
- Open Access Service Profile—Provides wireless access to clients without requiring them to log in.
- Custom Service Profile—Provides wireless access based on the combination of option you choose. (Use this option only if none of the other options applies to the type of service you want to offer.)

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A wizard for configuring the service profile appears.

6 Read the first page of the wizard and click **Next**.

7 Edit the service profile and type an SSID name.

8 Edit additional settings as applicable to the type of service profile you are creating.

For information, see the following:

- "Configuring Wireless Services" on page 51
- "Viewing and Configuring Wireless Services" section in the "Configuring Wireless Parameters" chapter of the *Wireless LAN Switch Manager Reference Manual*

9 Click **Finish**.

Create a Radio Profile and Map the Service Profile to It

To create a radio profile and map a service profile to it

1 Select the Configuration tool bar option.

2 In the Organizer panel, click the plus sign next to the WX switch.

3 Click the plus sign next to Wireless.

4 Select Radio Profiles.

5 In the Task List panel, select Radio Profile.

6 In the Name box, type the name of the radio profile (1 to 16 characters, with no spaces or tabs).

7 Click **Next**. Click **Next** again.

8 To map the radio profile to a service profile, select the service profile in the Available Service Profiles list and click **Add**.

9 Click **Finish**.

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Create Your MAPs

Depending on how your MAPs are connected to a WX switch, you need to create a *direct connect MAP* or a *distributed MAP* in your network plan in 3WXM. A direct connect MAP is connected to the wired network through a direct 10/100 Ethernet connection to a WX switch. A distributed MAP is connected to the WX switch indirectly through other Layer 2 or Layer 3 wired networking devices.

To create a directly connected MAP in 3WXM

1. Access the Create Direct-Connect AP wizard:
   - **a** Select the Configuration tool bar option.
   - **b** In the Organizer panel, click the plus sign next to the WX switch.
   - **c** Click the plus sign next to Wireless.
   - **d** Select Access Points.
   - **e** In the Task List panel, select Direct-Connect AP.
2. Select the WX port the MAP will be connected to from the Available Ports drop-down list.

Configuring a directly connected MAP in a port converts the port to an MAP access port. If the port is a statically configured member of a VLAN, the port is removed from the VLAN.

3. Click **Next**.
4. Select the MAP model from the MAP Model list.
5. To select the radio type for a single-radio model, click the MAP Radio Type box and select the radio type from the list:
   - **11a**—802.11a
   - **11b**—802.11b only
   - **11g**—802.11b/g
6. Click **Next**.

The non-editable number (1 or 2) indicates the radio number on the MAP.

7. To select the radio type for a single-radio model, click the MAP Radio Type box and select the radio type from the list:
   - **11a**—802.11a
   - **11b**—802.11b only
   - **11g**—802.11b/g

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8 Click **Next**.

9 Configure the radios:

a To enable the radio, select **Enabled**.

b In the Radio Profile list, select the profile to which the radio belongs.

c In the Channel Number list, select the channel number for the radio.

If RF Auto-Tuning for channel configuration is enabled, setting this value has no effect. The channel number is controlled by RF Auto-Tuning.

d In the Transmit Power box, specify the transmit power for the radio.

If RF Auto-Tuning for power configuration is enabled, setting this value has no effect. The power level is controlled by RF Auto-Tuning.

e If the MAP has two radios, click **Next** and go to step 9. Otherwise, go to step 10.

10 Click **Finish**.

To create a Distributed MAP in3WXM

1 Access the Create Distributed AP wizard:

a Select the Configuration tool bar option.

b In the Organizer panel, click the plus sign next to the WX switch.

c Click the plus sign next to Wireless.

d Select Access Points.

e In the Task List panel, select Distributed AP.

2 In the Name box, type a name (1 to 16 alphanumeric characters, with no spaces or tabs).

3 In the DAP Number box, specify the connection number for the WX switch's connection to this Distributed MAP. The range of valid connection numbers depends on the WX switch model:

- For a WX4400, you can specify a number from 1 to 300.
- For a WX1200, you can specify a number from 1 to 30.
- For a WXR100, you can specify a number from 1 to 8.

4 In the Serial Number box, type the serial number of the MAP.

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5 In the Fingerprint box, type the 16-digit hexadecimal number of the MAP's encryption fingerprint. Use either of the following formats:

- 11:22:33:44:55:66:77:88:99:aa:bb:cc:dd:ee:ff:00
- 1122:3344:5566:7788:99aa:bbcc:ddee:ff00

A MAP's fingerprint is the hash value of the MAP's public encryption key. The fingerprint is displayed on a label on the back of the MAP, and is labeled *RSA key*. If the MAP is already installed and operating, use the CLI command **display dap status** command to display the fingerprint.

The fingerprint is used for secure communication between the WX switch and the MAP, and applies only to Distributed MAPs.

6 Click **Next**.

7 Select the MAP model from the MAP Model list.

8 To select the radio type for a single-radio model, click the MAP Radio Type box and select the radio type from the list:

- **11a**—802.11a
- **11b**—802.11b only
- **11g**—802.11b/g

9 Click **Next**.

10 Configure the radios:

a To enable the radio, select **Enabled**.

b In the Radio Profile list, select the profile to which the radio belongs.

c In the Channel Number list, select the channel number for the radio.

If RF Auto-Tuning for channel configuration is enabled, setting this value has no effect. The channel number is controlled by RF Auto-Tuning.

d In the Transmit Power box, specify the transmit power for the radio.

If RF Auto-Tuning for power configuration is enabled, setting this value has no effect. The power level is controlled by RF Auto-Tuning.

e If the MAP has two radios, click **Next** and go to step 10. Otherwise, go to step 11.

11 Click **Finish**.

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Apply a Radio Profile to Each Radio

When you create a MAP, a new radio (or radios, depending upon the type of MAP created) are added into 3WXM. The radios use the default radio profile in 3WXM unless you create a new radio profile and apply it to each radio on the MAP.

For more information about creating a radio profile, see "Create a Radio Profile and Map the Service Profile to It" on page 100. For more information about creating an MAP, see "Create Your MAPs" on page 101.

To apply a radio profile to a radio

1. Select the Configuration tool bar option.
2. In the Organizer panel, click the plus sign next to the WX switch.
3. Click the plus sign next to Wireless.
4. Select Radio Profiles.
5. In the Radio Profiles table, select the radio profile.
6. Click **Properties**.
7. Click the Radio Selection tab.
8. Select the radios in the Available Members list and click **Move**.
9. Click **OK**.

You have completed the necessary steps for configuring your RF environment.

What's Next?

After you create your services ("Configuring Wireless Services" on page 51) and following the instructions in this chapter to create your RF environment, you need to deploy your configuration and enable monitoring. Optionally, you can improve your network monitoring options by modelling your floor and defining RF obstacles.

- For information about monitoring your network, see "Managing and Monitoring Your Network" on page 155.
- For information about enhancing RF Auto-Tuning with modelling to better define your site and improve monitoring options, see "Using RF Auto-Tuning with Modelling" on page 105.

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5 Using RF Auto-Tuning with Modelling

What Is RF Auto-Tuning with Modelling?

RF Auto-Tuning with modelling is a technique you can use to configure and implement your network that builds on the RF Auto-Tuning method. You will, as the name implies, still use RF Auto-Tuning (auto tuning) to adjust power and channel settings to provide RF signals to the coverage area for your users. You'll then enhance the auto tuning feature by providing modelling information about your geographic location.

To use this technique, you will complete the tasks described in "Using RF Auto-Tuning" on page 97. Then, you'll complete the following steps in your network plan:

1. Add site information (buildings and floors) or import a floor drawing
2. Add RF obstacles (optional)
3. Add an RF coverage area

By providing some information about your buildings and floors, you add enough details into 3WXM so that you can better visualize your network topology and support improved monitoring at your site.

To learn more about the benefits of RF Auto-Tuning with modelling, see "RF Auto-Tuning with Modelling" on page 32.

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Add Site Information

By adding minimal information about your buildings and floors at your site, you support improved monitoring for your network. You can manually add building and floor information or you can import a floor. For information about importing a floor plan, see "Import a Floor Plan" on page 128.

To add site information

1. Select the RF Planning tool bar option.
2. In the Organizer panel, click the name of the network plan.
3. Select Create Site in the Task List panel. The Create Site wizard, a series of dialog boxes, prompts you for information about the new site.
4. In the Site Name box, type a name for the site (1 to 80 alphanumeric characters, with no spaces or tabs), and click **Next**.
5. To change the Country Code, select the country where the network is to be deployed in the Country Code list.
6. In the Channel Set (802.11b/g) list, select the set of operating channels for any 802.11b/g MAP radios you plan to use (if different from the default), and click **Next**.
7. In the Number Of Buildings box, specify how many buildings are in your site, and click **Finish**.

   When you specify the number of buildings a site contains, 3WXM creates each building using the default settings. You can edit the buildings 3WXM creates or you can add new buildings.

To create a building

1. In the Organizer panel, click the site name.
2. Select Create Building in the Task List panel. The Create Building wizard prompts you for information about the new building.
3. In the Building Name box, type the name of the building (1 to 30 alphanumeric characters, with no spaces or tabs), and click **Next**.
4. In the Number Of Floors box, specify how many floors the building has.

   When you specify the number of floors a building contains, 3WXM creates each floor using the default settings. You can edit the floors 3WXM creates or you can add new floors.

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5 In the Starting Floor Level box, specify the floor number of the first floor in the building. To start with a subterranean floor, you can specify 0 or a negative floor number.

6 In the Skip Floor Levels box, specify floor numbers you want to skip. Skipping floors is useful when you want to model only certain floors in a building. To enter a list of floors, use commas to separate the floor numbers (example: 1,3,7). To enter a range, use a hyphen (example: 8-12).

7 Click **Finish** to close the wizard.

To add a floor to the building

1 In the Organizer panel, click the building name.

2 Select Create Floor in the Task List panel. The Create Floor wizard prompts you for information about the new floor.

3 In the Floor Name box, type the name of the floor (1 to 60 alphanumeric characters, with no spaces or tabs), and click **Next**.

4 To change the default attenuation for radios, type the number of dB in the 802.11a (dB) box or 802.11b/g (dB) box.

5 In the Height of the Ceiling box, type the number of feet or meters from the floor to the ceiling (1 to 1000 feet or meters).

6 Click **Finish** to close the wizard.

7 When you click on the floor's name in the Organizer panel, a view of the floor plan is displayed in the Content panel. Click on the ruler icon to set the scale of your floor.

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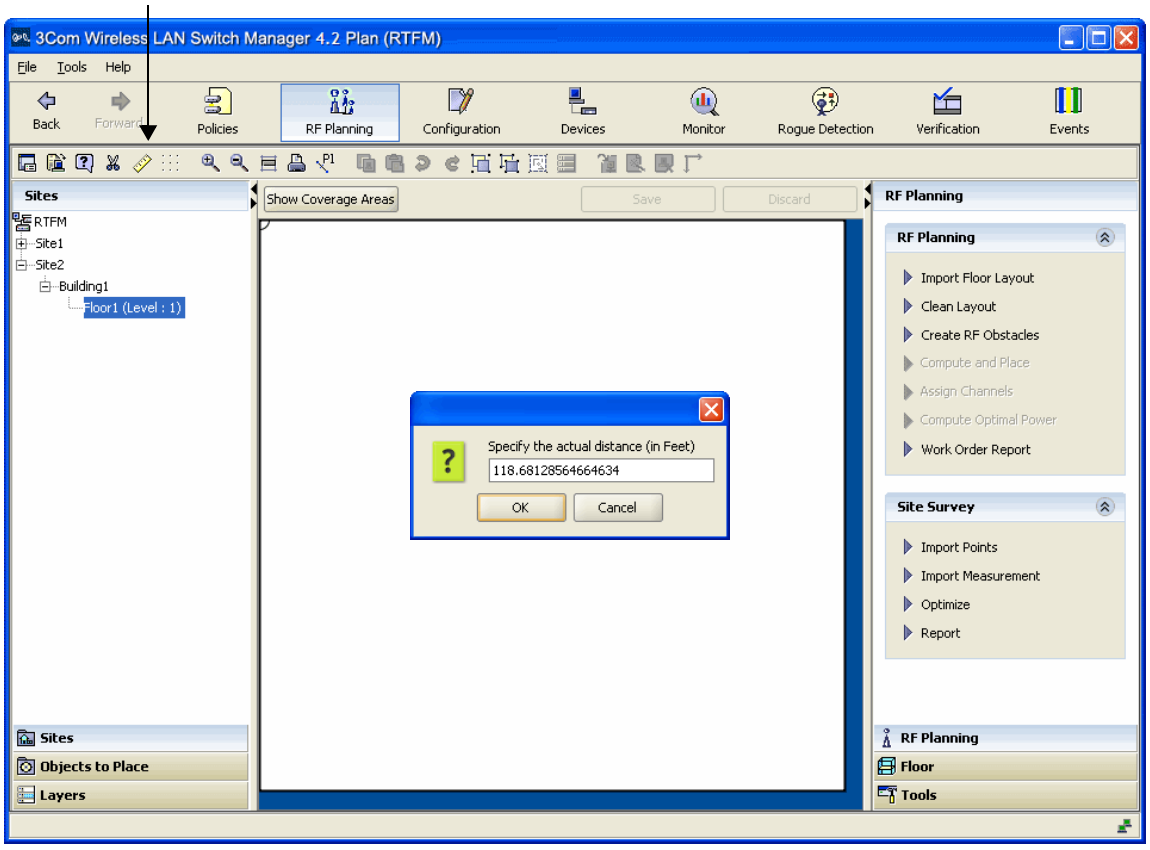

Insert RF Obstacles

Add major RF obstacles that will affect the placement of your MAPs, such as solid walls, barriers, or elevator shafts.

To add RF obstacles

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **Tools**.
3. In the RF Obstacle area under Layout, click one of the icons that most closely matches the RF obstacle you wish to place.
4. Click and drag the mouse to draw the location and shape of the RF obstacle on the floor.

   The Create RF Obstacle wizard is displayed.
5. Enter a description of the RF obstacle, and select the Obstacle Type from the list.

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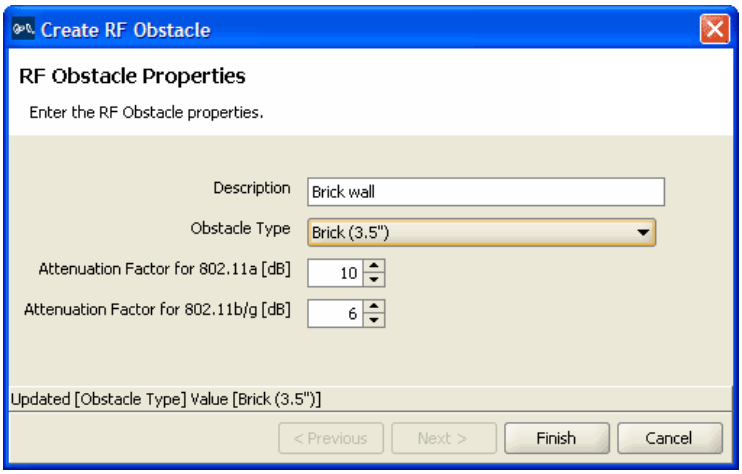
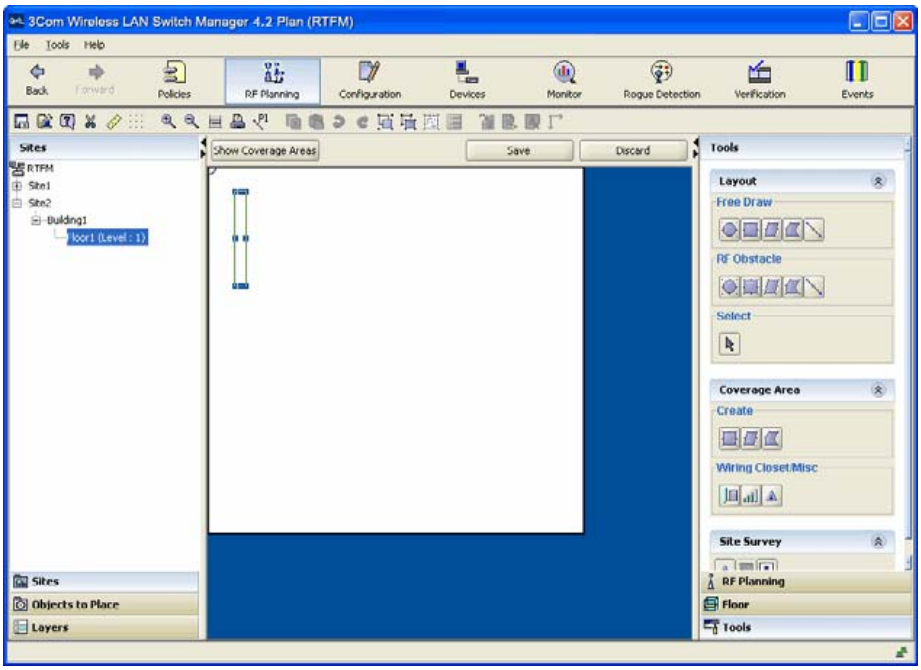
A default attenuation factor is displayed for the object type, or, you can select an attenuation factor that you believe more closely matches the RF obstacle.



6 Click **Finish**. The RF obstacle is added to your floor layout.



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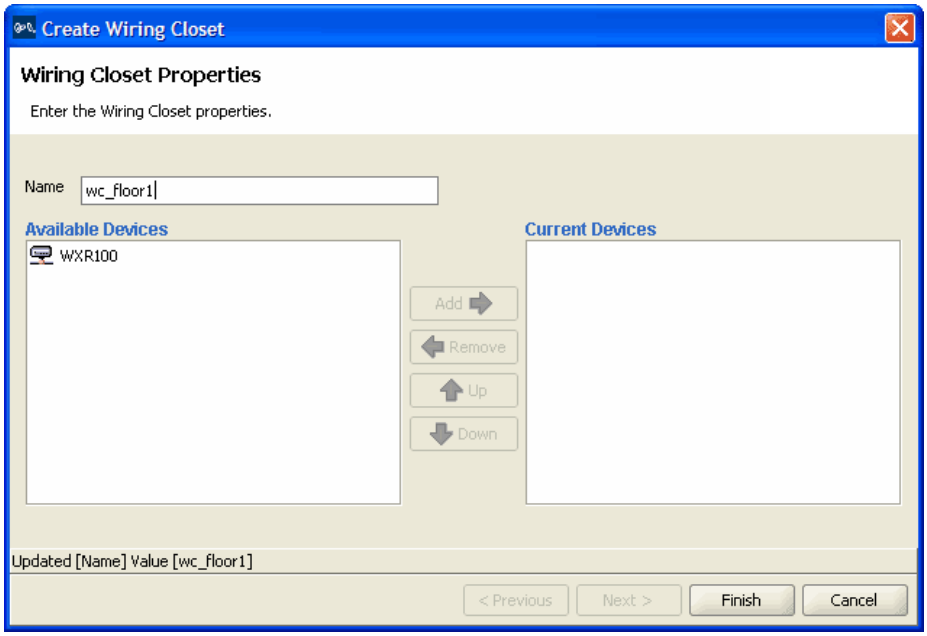
Create Your RF Coverage Area

To create your RF coverage area, you create a wiring closet (mandatory if you have direct MAPs in your plan), designate an area for RF coverage, and add your *distributed MAPs* or *direct MAPs* to the coverage area. Distributed MAPs are indirectly attached through intermediate Layer 2 or Layer 3 devices. Direct MAPs are directly attached to dedicated WX switch ports.

Create a Wiring Closet

To add the location of a wiring closet to the floor plan

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **Tools**.
3. In the Wiring Closer/Misc area under Coverage Area, click the (Insert Wiring Closet) icon.
4. Click in the floor display where you want to place the wiring closet. The Create Wiring Closet wizard appears.



5. In the Name box, type the name of the wiring closet (1 to 60 characters, with no tabs).
6. Click a WX switch in the Available Devices box, then click the **Add** button to move it to the Current Devices box.
7. Click **Finish** to save the changes. The wiring closet is displayed on your floor plan.

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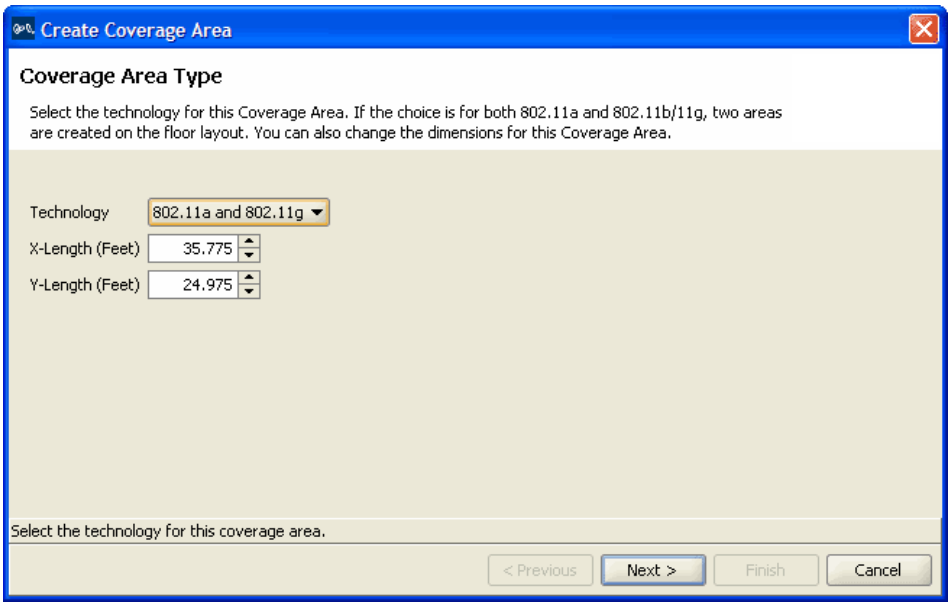
Create Your RF Coverage Area

To create your RF coverage area

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **Tools**.
3. In the Create area under Coverage Area, click one of the icons and draw the RF coverage area you want to add to the floor by clicking and dragging the mouse. The Create Coverage Area wizard appears.


Create Coverage Area
Coverage Area Type
Select the technology for this Coverage Area. If the choice is for both 802.11a and 802.11b/11g, two areas are created on the floor layout. You can also change the dimensions for this Coverage Area.
Technology
802.11a and 802.11g
X-Length (Feet)
35.775
Y-Length (Feet)
24.975
Select the technology for this coverage area.
< Previous
Next >
Finish
Cancel

4. Select one or more technologies you want to use in the coverage area and click **Next**. The wizard presents properties and association pages for the technology you chose in step 3.

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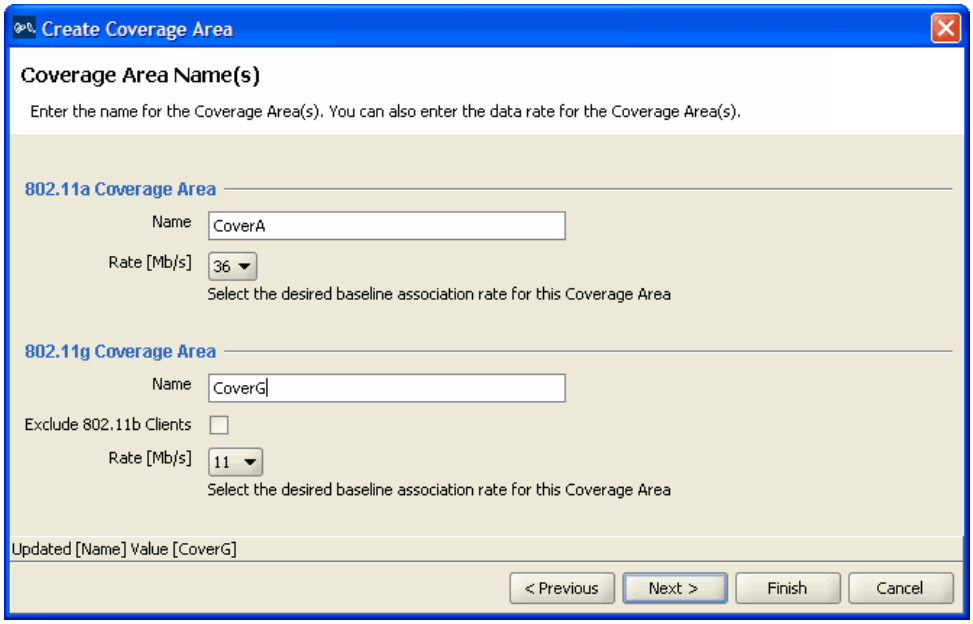

5 In the Name box for each technology, type a name for the coverage area (1 to 60 characters long, with no tabs).

6 In the Rate [Mb/s] list for each technology, select the average desired association rate for typical clients in this coverage area.

7 For 802.11g, to prevent the association of 802.11b clients to any radio in this coverage area, select **Exclude 802.11b clients**. To allow 802.11b clients to associate to radios in the coverage area, clear **Exclude 802.11b clients**.

Even when association of 802.11b clients is disabled, if an 802.11b/g radio detects a beacon from an 802.11b network, the radio enters protection mode to protect against interference.

8 Click **Next**. The Floor Properties page appears.

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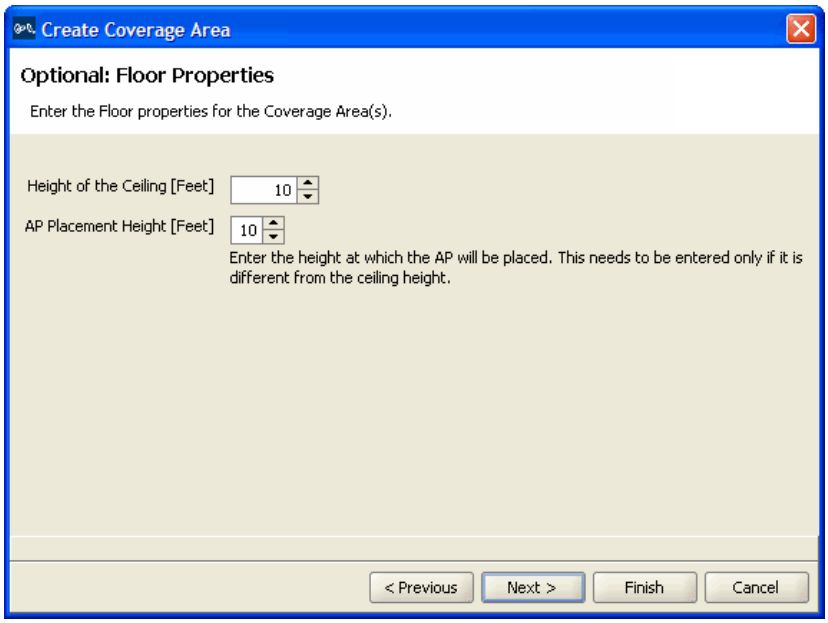
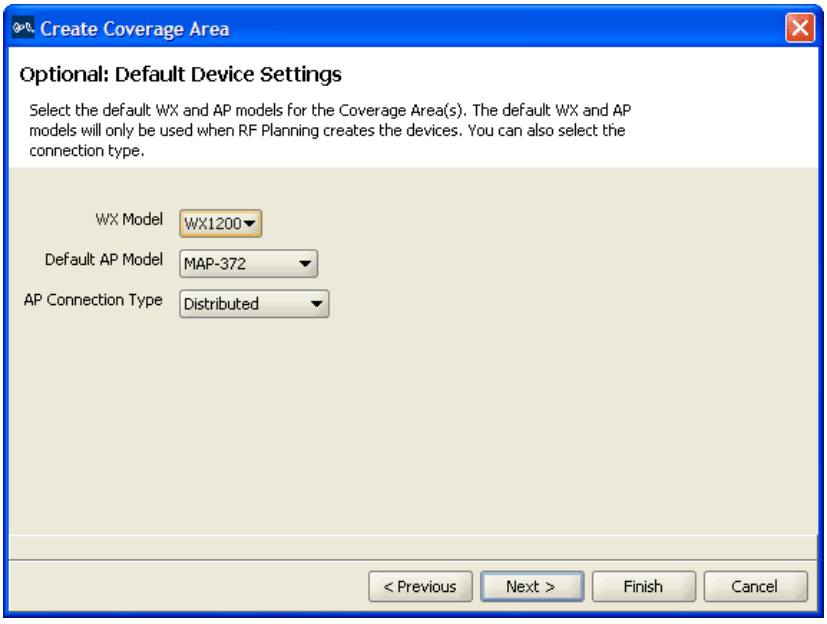

Create Coverage Area
Optional: Floor Properties
Enter the Floor properties for the Coverage Area(s).
Height of the Ceiling [Feet]
10
AP Placement Height [Feet]
10
Enter the height at which the AP will be placed. This needs to be entered only if it is different from the ceiling height.
< Previous
Next >
Finish
Cancel

9 To change the ceiling height, specify the new height in the Height of the Ceiling box.

10 To change the height where MAPs are mounted, specify the new mounting height in the MAP Placement Height box.

11 Click **Next**. The Default Device Settings page appears.


Create Coverage Area
Optional: Default Device Settings
Select the default WX and AP models for the Coverage Area(s). The default WX and AP models will only be used when RF Planning creates the devices. You can also select the connection type.
WX Model
WX1200
Default AP Model
MAP-372
AP Connection Type
Distributed
< Previous
Next >
Finish
Cancel

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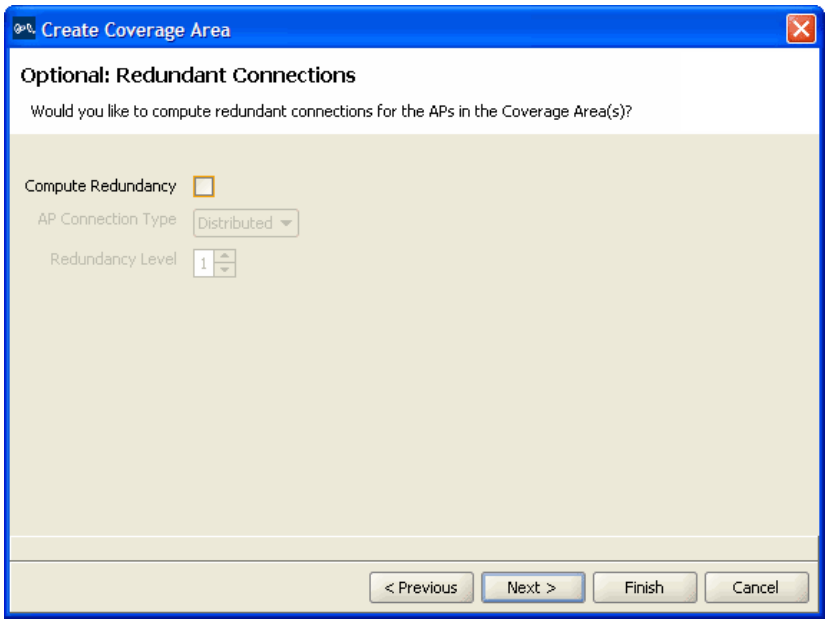
12 To change the default WX switch model, select the model from the WX Model list.

13 To change the default MAP model, select the model from the Default AP Model list.

14 To change the MAP connection type, select the type from the AP Connection Type list:

- Direct—MAPs are directly attached to dedicated WX switch ports.
- Distributed—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices.
- Distributed (Auto)—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices. They receive their configuration automatically using a profile that assigns a Distributed MAP number and name to the MAP from among the unused valid MAP numbers available on the switch.

15 Click **Next**. If you selected Direct or Distributed in the AP Connection Type list, the Redundant Connections page appears; go to step 16. If you selected Distributed (Auto) in the AP Connection Type list, the Capacity Planning for Data page appears; go to step 20.



16 To plan for redundant MAP connections to WX switches, select **Compute Redundancy**.

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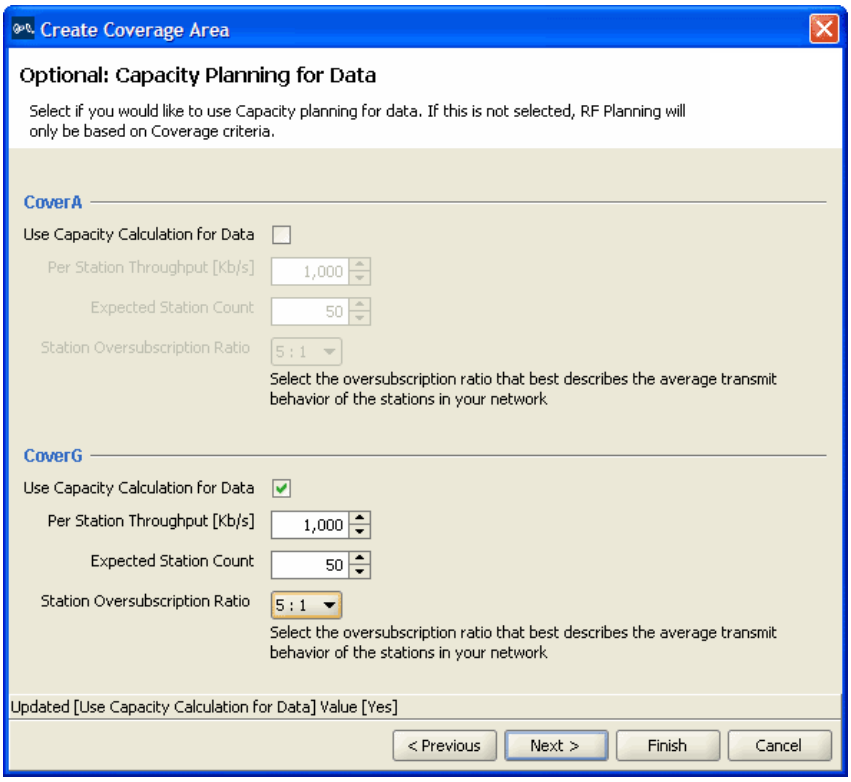
17 To change the MAP connection type for the redundant connection, select **Direct** or **Distributed** from the MAP Connection Type list.

18 To change the number of redundant connections for the distributed connection type, type the number in the Redundancy Level box.

For direct connections, the redundancy level is always 1.

19 Click **Next**. The Capacity Planning for Data page appears.


Create Coverage Area
Optional: Capacity Planning for Data
Select if you would like to use Capacity planning for data. If this is not selected, RF Planning will only be based on Coverage criteria.
CoverA
Use Capacity Calculation for Data
Per Station Throughput [Kb/s]
1,000
Expected Station Count
50
Station Oversubscription Ratio
5 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the stations in your network
CoverG
Use Capacity Calculation for Data
Per Station Throughput [Kb/s]
1,000
Expected Station Count
50
Station Oversubscription Ratio
5 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the stations in your network
Updated [Use Capacity Calculation for Data] Value [Yes]
< Previous
Next >
Finish
Cancel

20 To calculate MAP placement and configuration based on both coverage and on capacity, enable **Use Capacity Calculation for Data**. Otherwise, click **Next** and go to step 24.

By default, 3WXM performs only the coverage calculation. If you enable the **Use Capacity Calculation for Data** option, 3WXM performs both calculations.

21 In the Per Station Throughput list, specify the throughput (combined transmit and receive) in kilobits per second (Kbps) for a station.

22 In the Expected Station Count list, specify the number of clients you expect to be in the coverage area.

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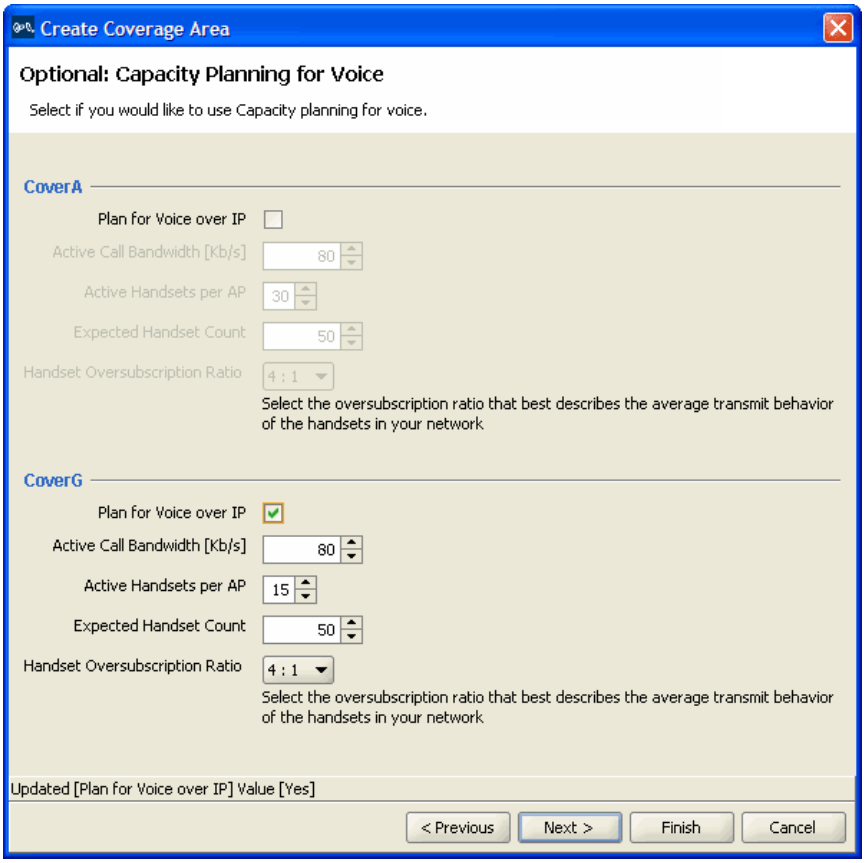
23 In the Station Oversubscription Ratio list, select the ratio for the average transmit behavior of the stations.

The station oversubscription ratio is the ratio of active clients compared to total clients. For example, the ratio 5:1 indicates that, statistically, 20 percent of the clients are active at any given time.

24 Click **Next**. The Capacity Planning for Voice page appears.


Create Coverage Area
Optional: Capacity Planning for Voice
Select if you would like to use Capacity planning for voice.
CoverA
Plan for Voice over IP
Active Call Bandwidth [Kb/s]
80
Active Handsets per AP
30
Expected Handset Count
50
Handset Oversubscription Ratio
4 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the handsets in your network
CoverG
Plan for Voice over IP
Active Call Bandwidth [Kb/s]
80
Active Handsets per AP
15
Expected Handset Count
50
Handset Oversubscription Ratio
4 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the handsets in your network
Updated [Plan for Voice over IP] Value [Yes]
< Previous
Next >
Finish
Cancel

25 To calculate MAP placement and configuration based on both coverage and on capacity for voice over IP, enable **Use Capacity Calculation for Voice**. Otherwise, click **Next** and go to step 30.

By default, 3WXM performs only the coverage calculation. If you enable the **Use Capacity Calculation for Voice** option, 3WXM performs both calculations.

26 In the Active Call Bandwidth list, specify the amount of bandwidth in kilobits per second (Kbps) that you expect for each call.

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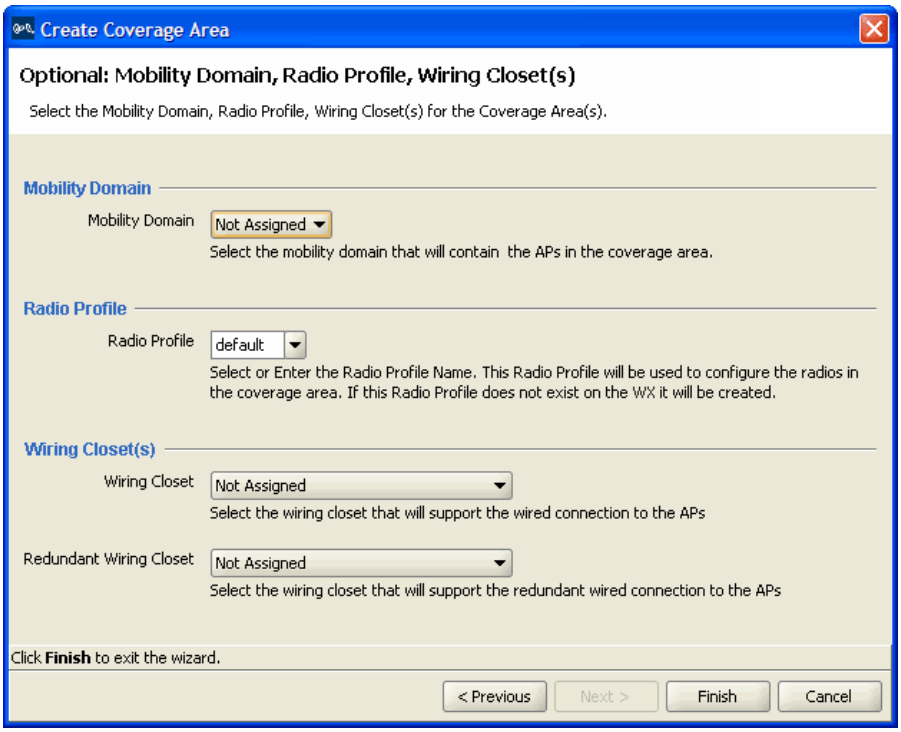
27 In the Active Handsets per AP list, specify the number of voice over IP phones that you want each MAP to handle.

28 In the Expected Handset Count list, specify the number of voice over IP phones you expect to be in the coverage area.

29 In the Handset Oversubscription Ratio list, select the ratio for the average transmit behavior of the voice over IP phones.

The handset oversubscription ratio is the ratio of active handsets compared to total handsets. For example, the ratio 4:1 indicates that, statistically, 25 percent of the voice over IP phones are active at any given time.

30 Click **Next**. The Mobility Domain, Radio Profile, Wiring Closet(s) page appears.


Create Coverage Area
Optional: Mobility Domain, Radio Profile, Wiring Closet(s)
Select the Mobility Domain, Radio Profile, Wiring Closet(s) for the Coverage Area(s).
Mobility Domain
Mobility Domain
Not Assigned
Select the mobility domain that will contain the APs in the coverage area.
Radio Profile
Radio Profile
default
Select or Enter the Radio Profile Name. This Radio Profile will be used to configure the radios in the coverage area. If this Radio Profile does not exist on the WX it will be created.
Wiring Closet(s)
Wiring Closet
Not Assigned
Select the wiring closet that will support the wired connection to the APs
Redundant Wiring Closet
Not Assigned
Select the wiring closet that will support the redundant wired connection to the APs
Click Finish to exit the wizard.
< Previous
Next >
Finish
Cancel

31 In the Mobility Domain list, select the Mobility Domain that contains the MAPs used for this coverage area.

32 In the Radio Profile list, select the radio profile used for this coverage area.

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The profiles available depend on the Mobility Domain you selected in step 31. The profile you select applies to all radios associated with the coverage area. If you type the name of a radio profile that does not already exist, 3WXM creates it.

33 In the Wiring Closet list, select the wiring closet that contains the WX switch or switches to be connected to the shared MAPs.

If the MAPs will be directly connected to WX switches, a wiring closet is required. If all the MAPs in the coverage area will be indirectly connected to WX switches through the network, a wiring closet is not required.

34 In the Redundant Wiring Closet list, select the wiring closet that will provide redundant connection to the MAPs. This is required for directly connected MAPs, if you require the MAPs to have redundant connections. Otherwise, this is not required.

35 Click **Finish** to complete the wizard and create the coverage area. The coverage area is now displayed on your floor.

Add MAPs

Add your direct MAPs or distributed MAPs to your network.

To add direct MAPs or distributed MAPs to your network

1 If you have not already done so, create a wiring closet and associate your WX switches to the closet. For more information, see "Create a Wiring Closet" on page 110.

2 Go to "Create Your MAPs" on page 101 for information about adding direct MAPs or distributed MAPs to your network. Once created, MAPs can be associated with a coverage area and added to the floor plan.

Associate MAPs to the Coverage Area

Associate both your distributed MAPs and direct MAPs to a coverage area on the floor.

To associate MAPs to the coverage area

1 Select the RF Planning tool bar option.

2 In the Content panel, display the floor plan where the MAPs are to be installed.

3 In the Organizer panel, click on **Coverage Areas**.

4 Right-click the Coverage Area to which the MAPs are to be associated, and select Edit Properties from the menu. The Coverage Area Properties dialog for the selected coverage area appears.

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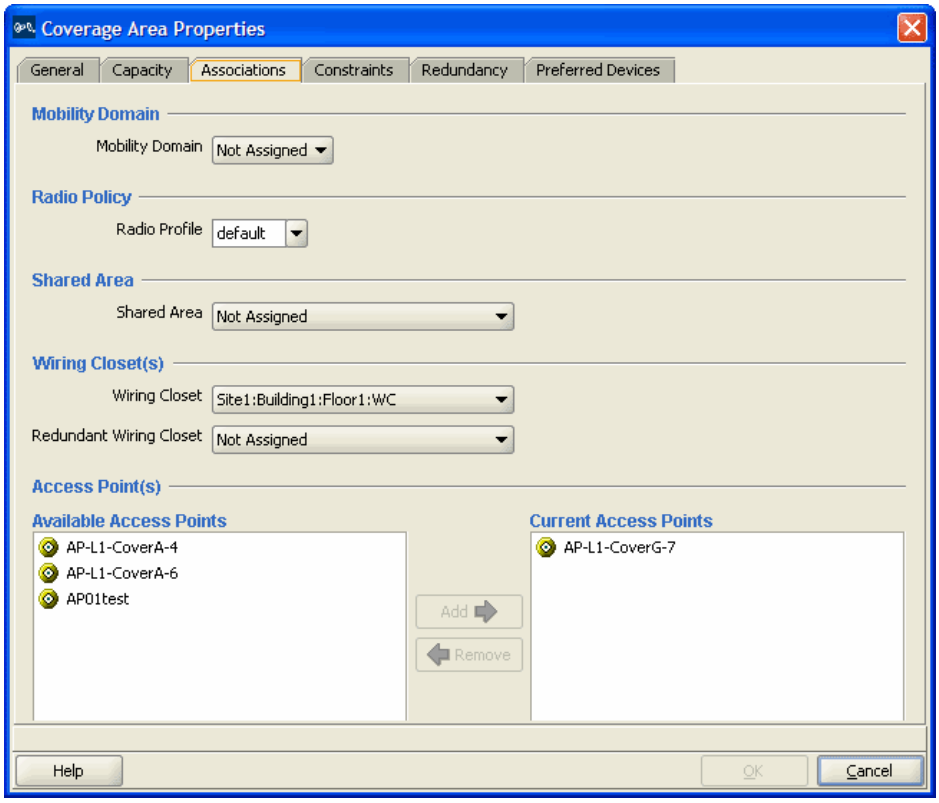
5 Click the **Associations** tab to display area associations information for the coverage area.



6 In the Available Access Points box, select one or more available MAPs to use in the coverage area, then click **Add** to move the MAPs to the Current Access Points box.

7 Click **OK** to close the dialog box.

8 In the Organizer panel, click on **Objects to Place**. A list of the MAPs you created is displayed in the panel.

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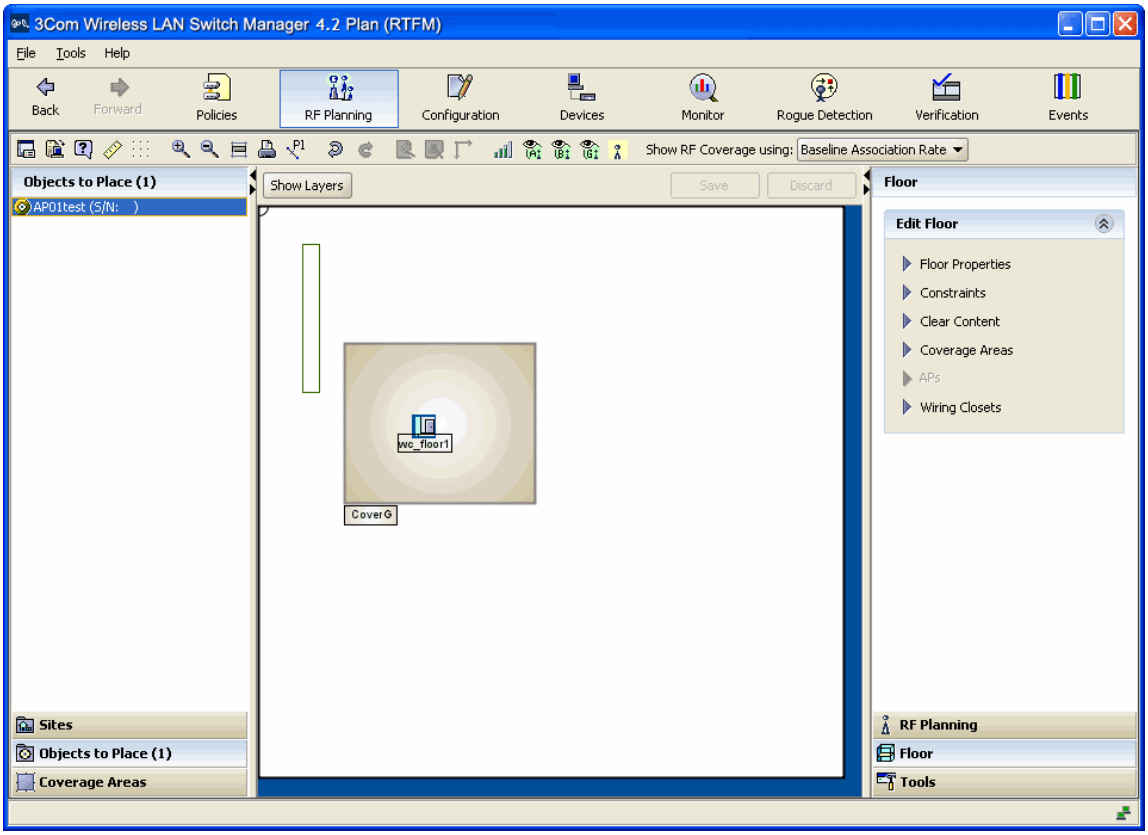

9 Click on the **MAP** icon, then click on the location where you installed the MAP. The MAP icon moves from the Objects To Place panel to its location on the floor.

What's Next?

This section provides cross references to information on the following tasks:

- "Using RF Planning" on page 121
- "Managing and Monitoring Your Network" on page 155

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6 USING RF PLANNING

What is RF Planning?

RF Planning is a technique you can use to import detailed information about your site into 3WXM, add RF obstacle information and third-party APs, and configure your RF coverage area at a finer level than is possible using the RF Auto-Tuning with modelling technique.

By defining sites, buildings, and floors, you provide 3WXM with the necessary information to modularly manage large networks based on geographical or organizational boundaries. For example, a network plan can represent a campus-wide network. 3Com recommends that you limit a network plan to a single campus or Mobility Domain. A network plan is also limited to one country, since a network plan only supports one common country code for the WX switches contained in it.

To use the RF planning technique:

- Prepare your floor plan graphic files
- Add site information
- Add RF obstacles
- Add an RF coverage area
- Create a work order
- Install your equipment
- Deploy your configuration

To learn more about the benefits of RF Planning, see "RF Planning" on page 33.

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Prepare the Floor Drawings

If your floor drawings are contained in JPEG or GIF files, this step does not apply. Go directly to "Define Site Information" on page 123.

If you plan to import AutoCAD DXF™ or AutoCAD DWG files into 3WXM, you should perform some "clean up" work before importing the files. Doing this work before you import the files into 3WXM creates a more compact file, requiring less storage space. Typically, the more CAD diagram cleanup that is done within the CAD software, the more smoothly the drawing will import into 3WXM.

To clean up the AutoCAD file:

- Perform an audit
- Turn on, unlock, and unfreeze all layers
- Remove unnecessary notations
- Purge unused blocks, line types, and layers

Typically, based on the drawing technique chosen when the drawing file was created in AutoCAD or TurboCAD, a single object may be drawn with more than one line; for example, walls. When such an object is imported, it results in more than one object in 3WXM. To avoid the actual object being defined as more than one obstacle, delete parallel lines within a certain distance.

Another method you can use to achieve the same result is to group all the lines into one object. For example, you might group four lines that form an office or conference room to create one attenuation factor for that entire area. Or, group multiple lines that were drawn in the floor plan to create a bigger line.

Grouping lines is not always recommended. For example, grouping lines into one object does not work well with polylines. Grouped polylines are recognized by the planning tool in 3WXM as a single, monolithic obstacle. This causes incorrect results when viewing RF coverage.

Objects must not be RF Obstacles or Groups before Clean Layout is performed.

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After you import the file into 3WXM, you have the opportunity to remove any unnecessary objects overlooked during your initial preparation of the floor drawings. To do this, you can use the Clean Layout feature and other editing tools in the Building wizard.

For more information about how to prepare the AutoCAD files for 3WXM, refer to the *Wireless LAN Switch Manager Reference Manual*.

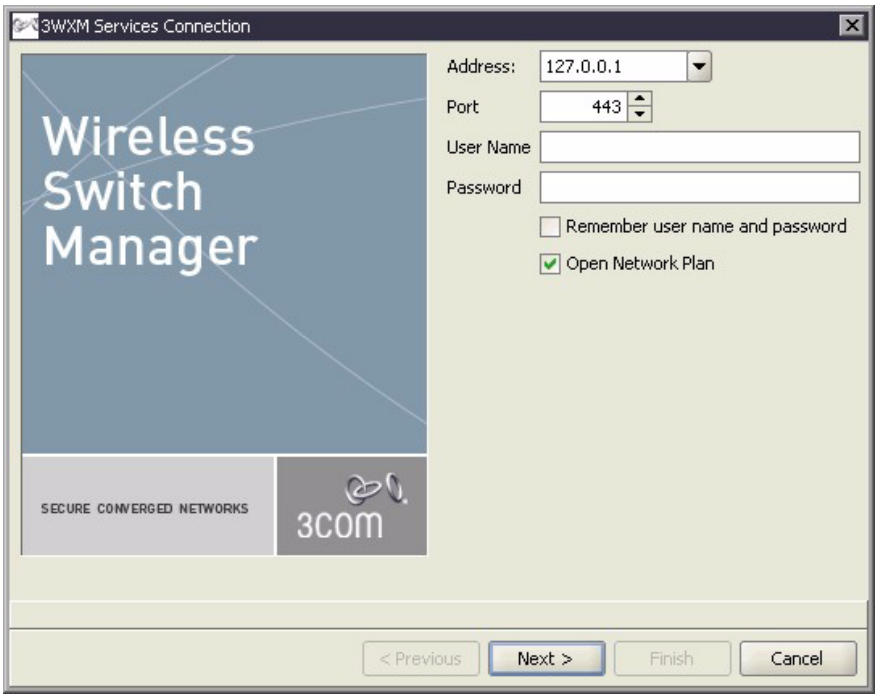
Define Site Information

You define your site with information about your campus, buildings, and floors. In addition, you describe the attenuation characteristics of the location and specify the traffic engineering needs (bandwidth and reliability) of the users.

*3WXM commits your work into the network plan only when you click **Finish**, not when you click **Next**. Changes are not persistently saved until you save the network plan.*

To create a network plan

1 Connect to a host running 3WXM Services. When you start 3WXM, the 3WXM main window and the 3WXM Services Connection dialog box appear.



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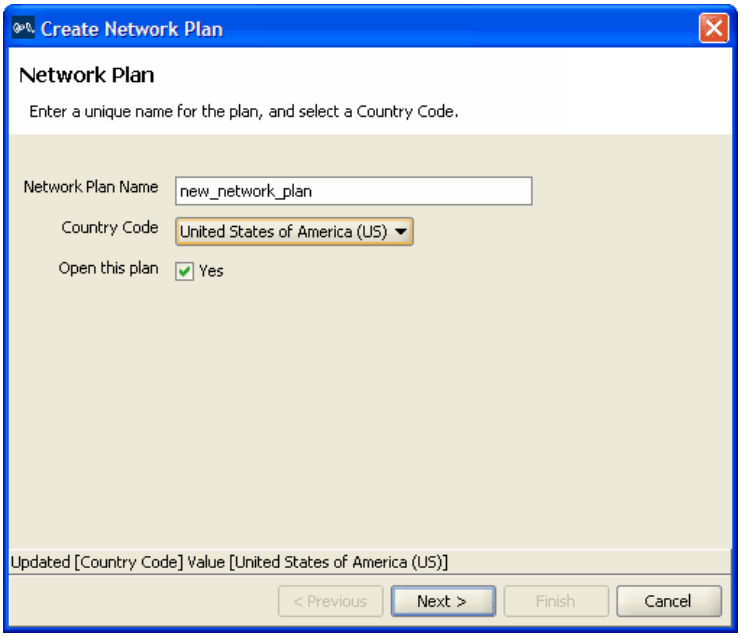
2 In the 3WXM Services Connection dialog box, enter the IP address of a host running 3WXM Services, optionally enter a user name and password, and click **Next**.

If the 3WXM Service is installed on the same machine as the one you are using to run 3WXM, enter 127.0.0.1 as the IP address. This is a standard IP loopback address.

3 After a connection is established to the specified 3WXM Services host, select **File > New Network Plan**. The Create Network Plan wizard appears.



4 In the Network Plan Name box, type a name for the network plan. You can use 1 to 60 alphanumeric characters, with no spaces, tabs, or any of the following: slash (/), backslash (\), quotation marks (" "), asterisk (*), question mark (?), angle brackets (< >), or vertical bar (|).

5 In the Country Code list, select the country where the network is to be deployed.

You must select a country code before continuing.

6 Click **Next** to save the network plan on the server and open it in 3WXM.

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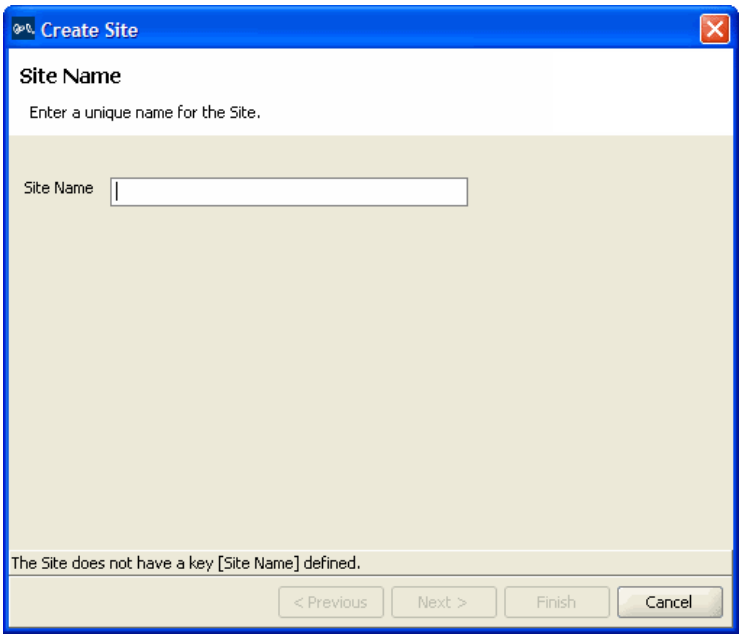
To add site information

1. Select the RF Planning tool bar option.
2. In the Organizer panel, click the name of the network plan.
3. Select Create Site in the Task List panel. The Create Site wizard, a series of dialog boxes, prompts you for information about the new site.



4. In the Site Name box, type a name for the site (1 to 80 alphanumeric characters, with no spaces or tabs), and click **Next**.
5. To change the Country Code, select the country where the network is to be deployed in the Country Code list.
6. In the Channel Set (802.11b/g) list, select the set of operating channels for any 802.11b/g MAP radios you plan to use (if different from the default), and click **Next**.
7. In the Number Of Buildings box, specify how many buildings are in your site, and click **Finish**.

   When you specify the number of buildings a site contains, 3WXM creates each building using the default settings. You can edit the buildings 3WXM creates or you can add new buildings.

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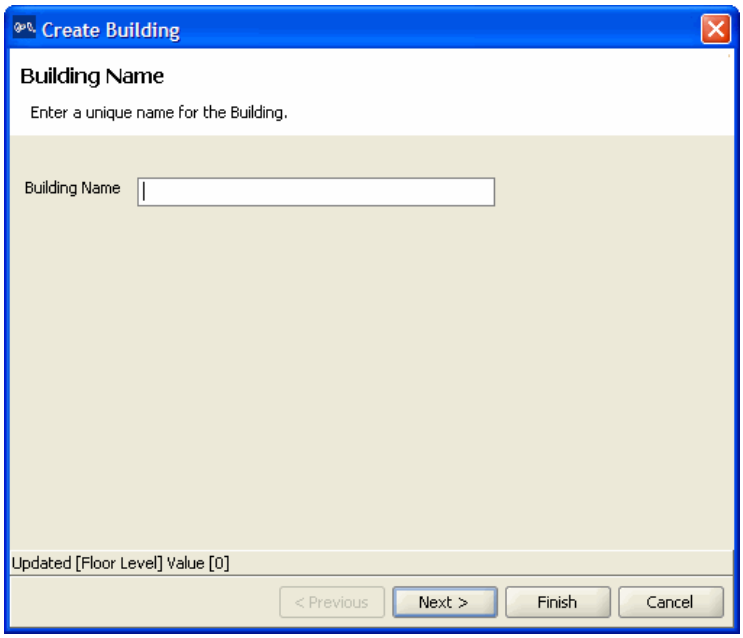
To create a building

1 In the Organizer panel, click the site name.

2 Select Create Building in the Task List panel. The Create Building wizard prompts you for information about the new building.



3 In the Building Name box, type the name of the building (1 to 30 alphanumeric characters, with no spaces or tabs), and click **Next**.

4 In the Number Of Floors box, specify how many floors the building has.

When you specify the number of floors a building contains, 3WXM creates each floor using the default settings. You can edit the floors 3WXM creates or you can add new floors.

5 In the Starting Floor Level box, specify the floor number of the first floor in the building. To start with a subterranean floor, you can specify 0 or a negative floor number.

6 In the Skip Floor Levels box, specify floor numbers you want to skip. Skipping floors is useful when you want to model only certain floors in a building. To enter a list of floors, use commas to separate the floor numbers (example: 1,3,7). To enter a range, use a hyphen (example: 8-12).

7 Click **Finish** to close the wizard.

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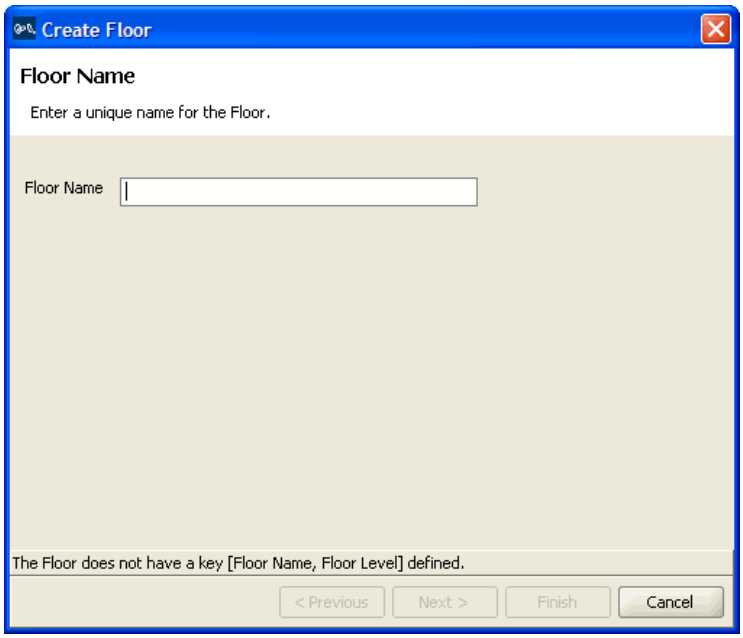
To add a floor to the building

1. In the Organizer panel, click the building name.
2. Select Create Floor in the Task List panel. The Create Floor wizard prompts you for information about the new floor.



3. In the Floor Name box, type the name of the floor (1 to 60 alphanumeric characters, with no spaces or tabs), and click **Next**.
4. To change the default attenuation for radios, type the number of dB in the 802.11a (dB) box or 802.11b/g (dB) box.
5. In the Height of the Ceiling box, type the number of feet or meters from the floor to the ceiling (1 to 1000 feet or meters).
6. Click **Finish** to close the wizard.

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Import a Floor Plan

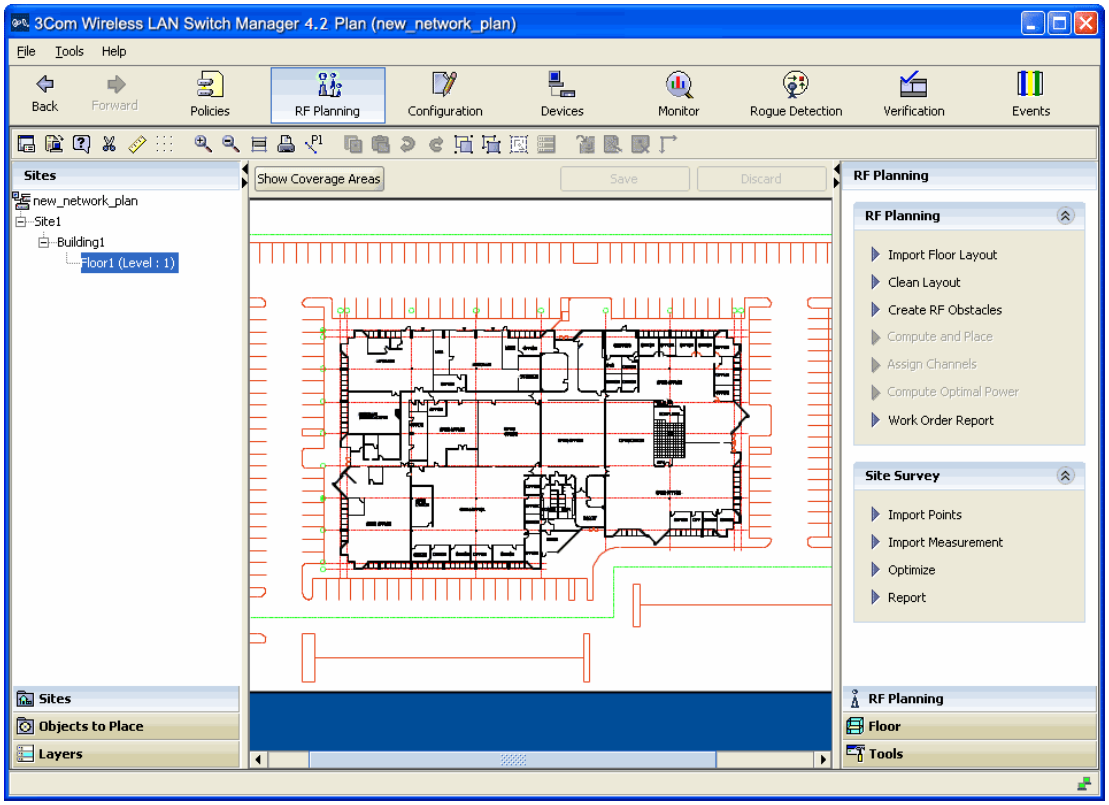
Import existing floor plans into 3WXM. The file can be in one of the AutoCAD DXF, AutoCAD DWG, JPEG, or GIF formats.

3Com recommends that you modify the AutoCAD files from AutoCAD to remove unnecessary objects and layers; then save them in .dxf format. For more information about how to modify AutoCAD files, see "Prepare the Floor Drawings" on page 122.

To import a floor drawing:

1. In the Organizer panel, click on the plus sign next to the building to expand it, then click on the name of the floor for which you are importing the drawing. An empty floor layout appears in the Content panel.
2. In the Task List panel, under RF Planning, select Import Floor Layout. Browse to the file you wish to import, then click **Finish**. The imported drawing is displayed in the Content panel.

Figure 7 Floor Plan After Importing



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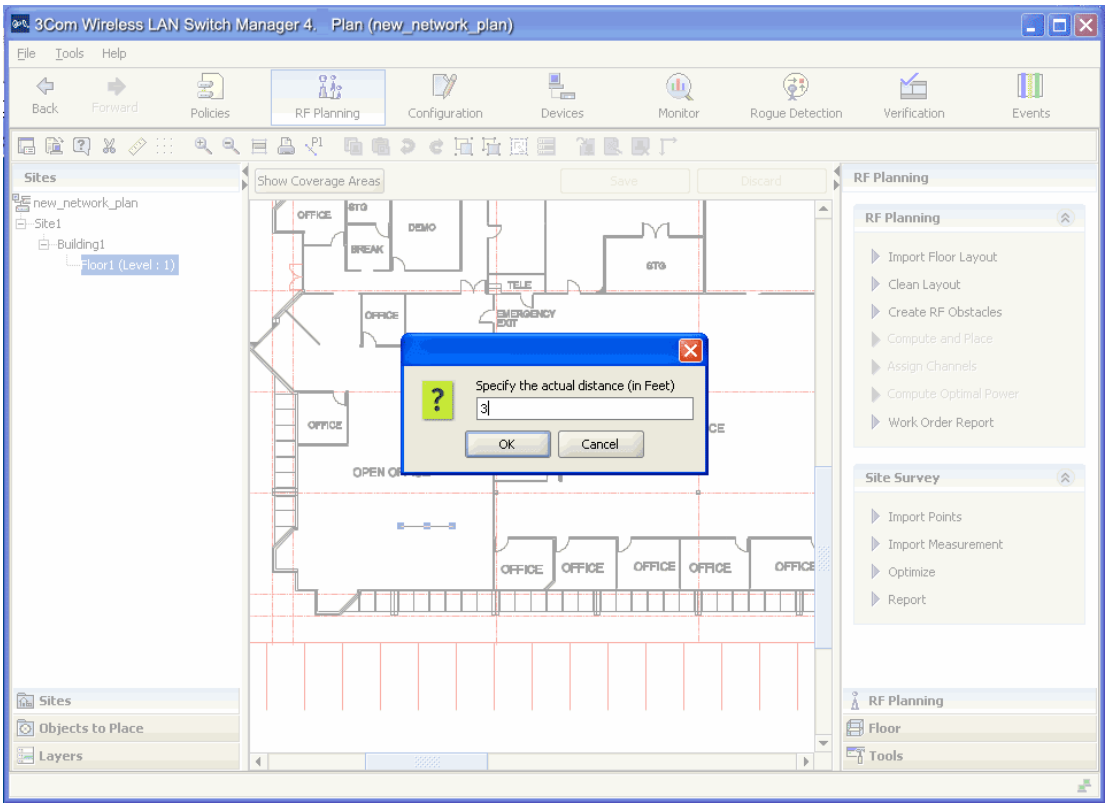
Set the Scale

Set the scale on your floor plan to better define the distance between objects in your network.

To set the scale

1. Display the floor plan in the Content panel.
2. Click on the toolbar.
   - **a** Draw a line on the floor plan over an object whose length you know; for example, a 3-foot door.
   - **b** Enter the actual length of the object in the pop-up box.
   - **c** Click **OK**.



You may want to zoom in the object to be used to define the scale to make this task easier.

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Clean Layout

Clean up your floor drawings further if unnecessary objects still remain after you your initial floor drawing cleanup.

Note the following when cleaning up a drawing:

- Drawing cleanup does not apply to GIF or JPEG drawings.
- Drawing cleanup does not change objects that are grouped.
- If two objects that would normally be cleaned (such as two parallel lines close together) exist on different layers, then neither object is removed.

For more information about cleaning up your floor plans, see "Prepare the Floor Drawings" on page 122.

To clean up a drawing

1. Display the floor plan in the Content panel.
2. In the Task List panel, under RF Planning, click **Clean Layout**. The Floor Plan Clean Up wizard appears.

   Select the items you would like to remove from the floor plan. Select the layers you want to affect.

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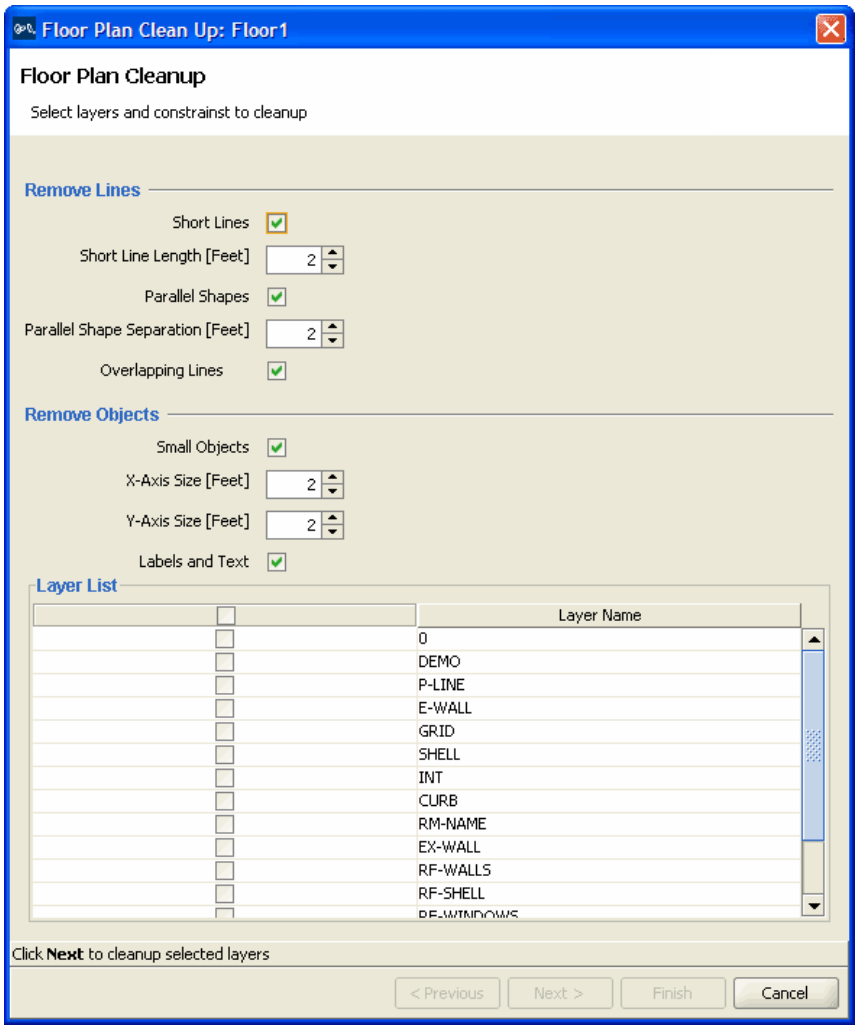

3 Click **Next**.

Cleanup progress is displayed at the bottom of the wizard.

4 You can display a Before Cleanup and After Cleanup view when cleanup is complete.

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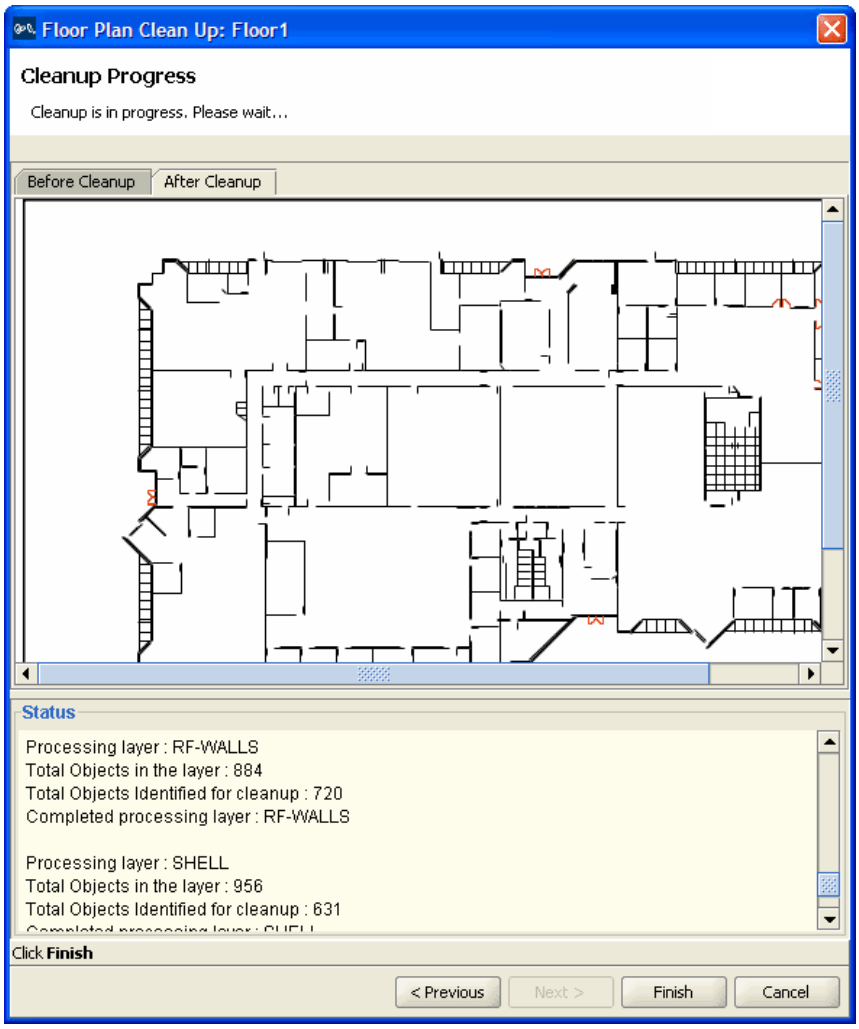

5 When you are satisfied with the results, click **Finish**.

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Model RF Obstacles

When planning a 3Com network, you need to consider how the building layout and physical objects affect signal loss. Walls, windows, and doors absorb RF signals, and different building materials have different attenuation factors.

You can model an RF obstacle on your floor plan and assign the obstacle type and attenuation factor, or you can assign an obstacle type and attenuation factor to objects in a DWG or DXF drawing. 3WXM uses these values when calculating coverage for the network.

If you do not have an imported drawing, or if you are working with a GIF or JPEG image, you must create RF obstacles manually. If you are using an imported CAD drawing, you can convert many of the objects in the drawing into RF obstacles. All objects similar in construction material should be placed in one layer. For example, if the drawing file has walls spread out in different layers, but after performing a site-survey, they walls were found to be similar in material construction, it is better to put them in one layer. In this way, the RF attenuation assignment can be performed in one step.

This section show how to select and draw objects and convert them into RF obstacles. 3WXM preserves the layers defined in a CAD drawing.

Table 13 provides some common AutoCAD layer terminology.

Table 13 Common AutoCAD Layer Terminology

AutoCAD Layer Name	Commonly Represents...
glaz	windows
scol	steel columns
p-fixt	bathroom
p-part	bathroom stall partitions
ext	exterior
int	interior

To create RF obstacles for all objects in a layer

1. Click **Layers** in the Organizer panel to bring up a list of the layers in the drawing.
2. Right-click one of the layers in the Organizer panel.

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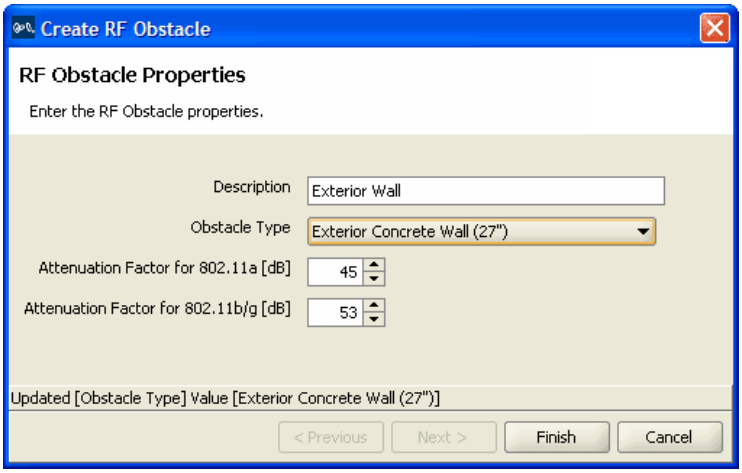
3 Select Create RF Obstacles from the menu that is displayed. The Create RF Obstacle dialog box appears.



4 Define the RF obstacle.

5 Click **Finish**.

The layer's objects are now obstacles in your floor plan.

Import a Site Survey

You can import RF measurement data by means of a site survey done outside of 3WXM. Using the Site Survey Order report from 3WXM, a map is created of your site that can be used in an Ekahau site survey. After the survey is complete, the measurement data can be imported back into 3WXM, and RF obstacles adjusted. In this way, actual, measured information about RF obstacles can be obtained and incorporated into your plan.

This guide contains post-deployment information about optimization on "Displaying the RF Coverage Area" on page 189. For pre-deployment information about optimization, see "Optimizing a Network Plan" in the *Wireless LAN Switch Manager Reference Manual*.

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Plan RF Coverage

How you plan the RF coverage for your network depends on whether you are planning for the widest coverage or are planning for capacity. There are other contributing factors. One group of users may be mobile and require high throughput performance (a higher bandwidth), while another group of users are more stationary and require less throughput.

Select the **RF Coverage** tab in the Create Building wizard to define your coverage area. This section contains the following coverage tasks:

- "Add Wiring Closets" on page 135
- "Create Coverage Areas" on page 136
- "Compute and Place MAPs" on page 144
- "Assign Channel Settings" on page 146
- "Calculate Optimal Power" on page 148
- "Display Coverage" on page 150

Add Wiring Closets

A wiring closet is a container for switches. You need to add at least one wiring closet location to the floor plan. Also consider if you are installing direct MAPs. Direct MAPs (access points directly connected to the WX) should be connected to the WX with UTP Cat 5 cabling. The distance between the MAP and the WX in the wiring closet can not exceed 100 meters (330 feet).

To add a wiring closet

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **Tools**.
3. In the Wiring Closer/Misc area under Coverage Area, click the (Insert Wiring Closet) icon.
4. Click in the floor display where you want to place the wiring closet. The Create Wiring Closet wizard appears.

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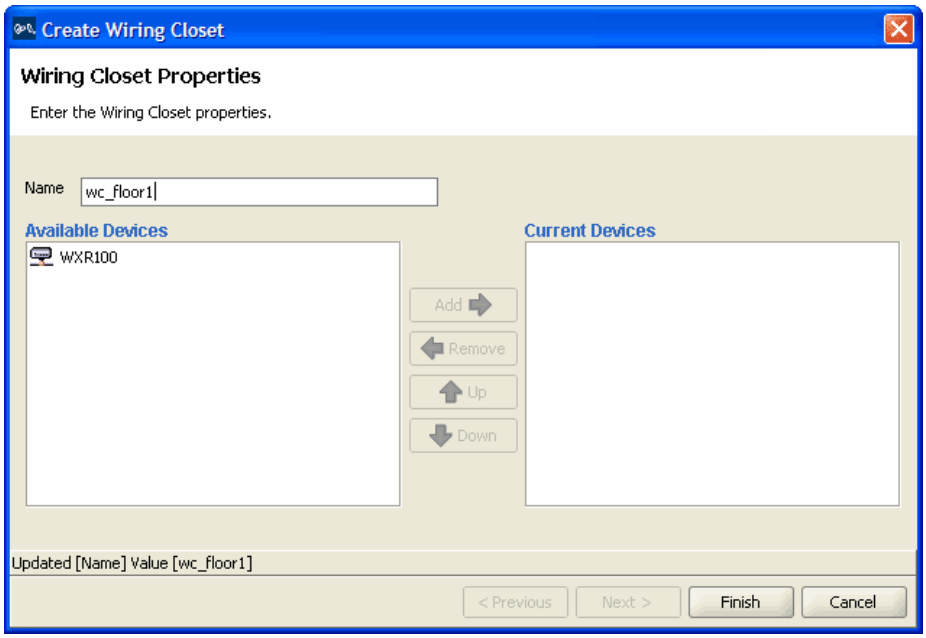

5 In the Name box, type the name of the wiring closet (1 to 60 characters, with no tabs).

6 Click a WX switch in the Available Devices box, then click the **Add** button to move it to the Current Devices box.

7 Click **Finish** to save the changes. The wiring closet is displayed on your floor plan.

Create Coverage Areas

The RF coverage area is the geographical area in your network you define RF coverage. As you configure the RF coverage area, consider the amount of bandwidth required for the area, as well as the number of users. You define the coverage area graphically on your floor plan using the coverage area drawing tool. Almost all shapes for a coverage area are possible. However, the following restrictions apply:

- A shape where two sides intersect each other is not permitted.
- A shared coverage area where there is a partial intersection is not supported.

3WXM supports the sharing of coverage areas if one area is completely within a larger area. For example, you might want to provide 802.11a and 802.11b coverage in a conference room that is part of a larger coverage area only providing 802.11a coverage. MAPs are shared only in the overlapped area.

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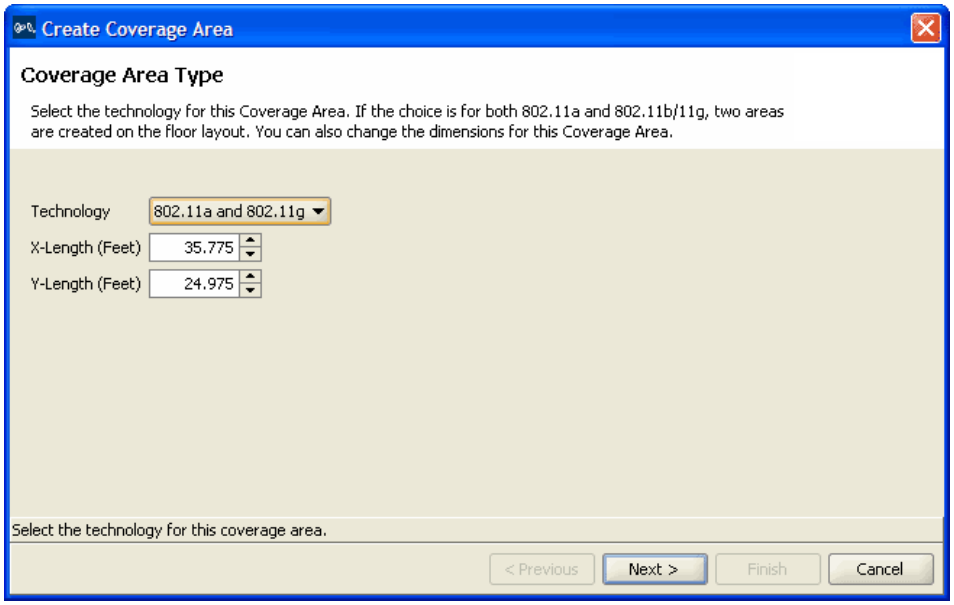
When you draw a coverage area, it aligns to the grid to provide a whole number for width and height of the shape.

To create a coverage area

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **Tools**.
3. In the Create area under Coverage Area, click one of the icons and draw the RF coverage area you want to add to the floor by clicking and dragging the mouse. The Create Coverage Area wizard appears.


Create Coverage Area
Coverage Area Type
Select the technology for this Coverage Area. If the choice is for both 802.11a and 802.11b/11g, two areas are created on the floor layout. You can also change the dimensions for this Coverage Area.
Technology
802.11a and 802.11g
X-Length (Feet)
35.775
Y-Length (Feet)
24.975
Select the technology for this coverage area.
< Previous
Next >
Finish
Cancel

4. Select one or more technologies you want to use in the coverage area and click **Next**. The wizard presents properties and association pages for the technology you chose in step 3.

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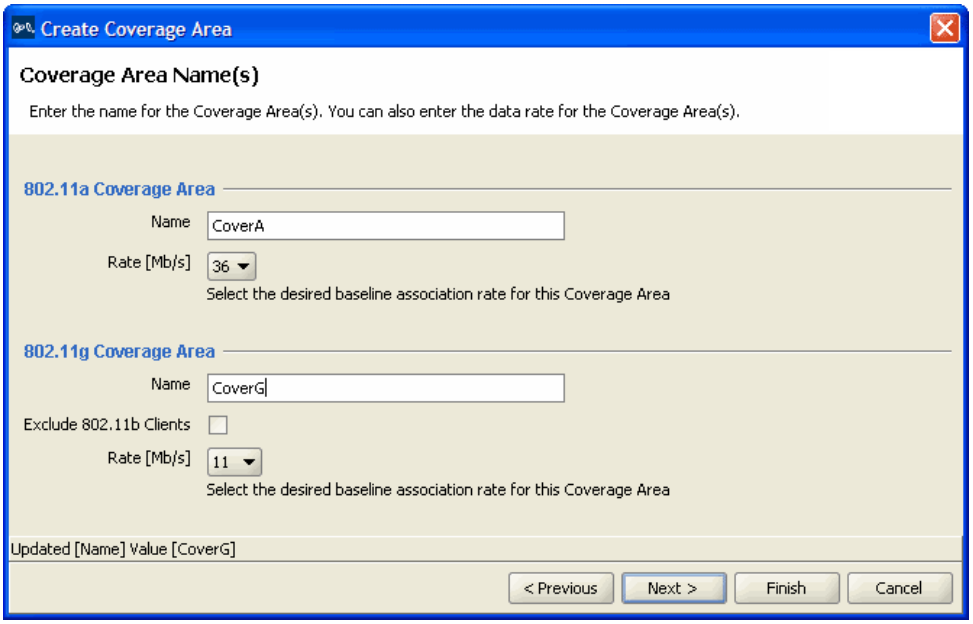

5 In the Name box for each technology, type a name for the coverage area (1 to 60 characters long, with no tabs).

6 In the Rate [Mb/s] list for each technology, select the average desired association rate for typical clients in this coverage area.

7 For 802.11g, to prevent the association of 802.11b clients to any radio in this coverage area, select **Exclude 802.11b clients**. To allow 802.11b clients to associate to radios in the coverage area, clear **Exclude 802.11b clients**.

Even when association of 802.11b clients is disabled, if an 802.11b/g radio detects a beacon from an 802.11b network, the radio enters protection mode to protect against interference.

8 Click **Next**. The Floor Properties page appears.

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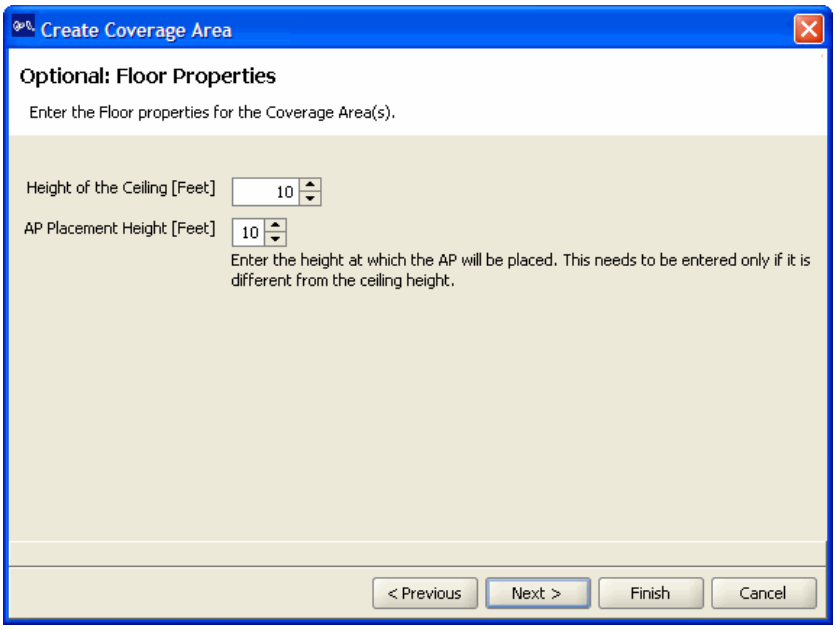
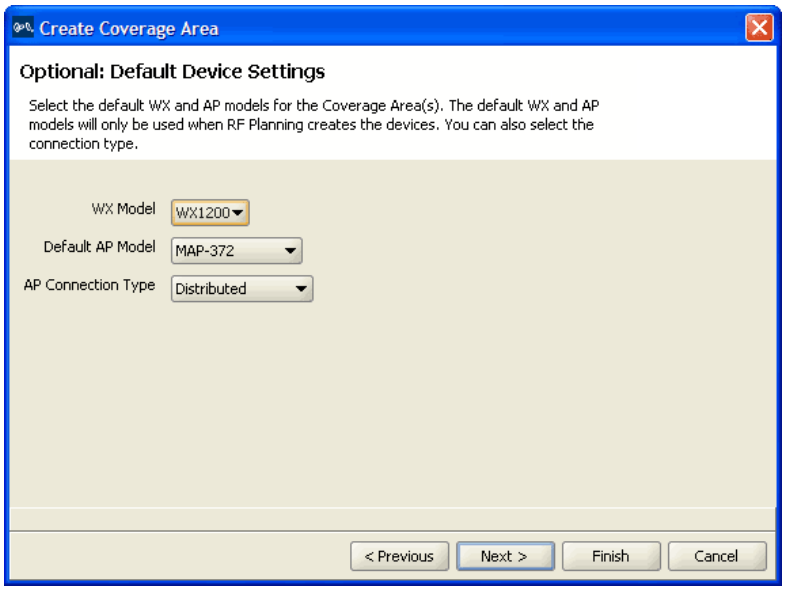

Create Coverage Area
Optional: Floor Properties
Enter the Floor properties for the Coverage Area(s).
Height of the Ceiling [Feet]
10
AP Placement Height [Feet]
10
Enter the height at which the AP will be placed. This needs to be entered only if it is different from the ceiling height.
< Previous
Next >
Finish
Cancel

9 To change the ceiling height, specify the new height in the Height of the Ceiling box.

10 To change the height where MAPs are mounted, specify the new mounting height in the MAP Placement Height box.

11 Click **Next**. The Default Device Settings page appears.


Create Coverage Area
Optional: Default Device Settings
Select the default WX and AP models for the Coverage Area(s). The default WX and AP models will only be used when RF Planning creates the devices. You can also select the connection type.
WX Model
WX1200
Default AP Model
MAP-372
AP Connection Type
Distributed
< Previous
Next >
Finish
Cancel

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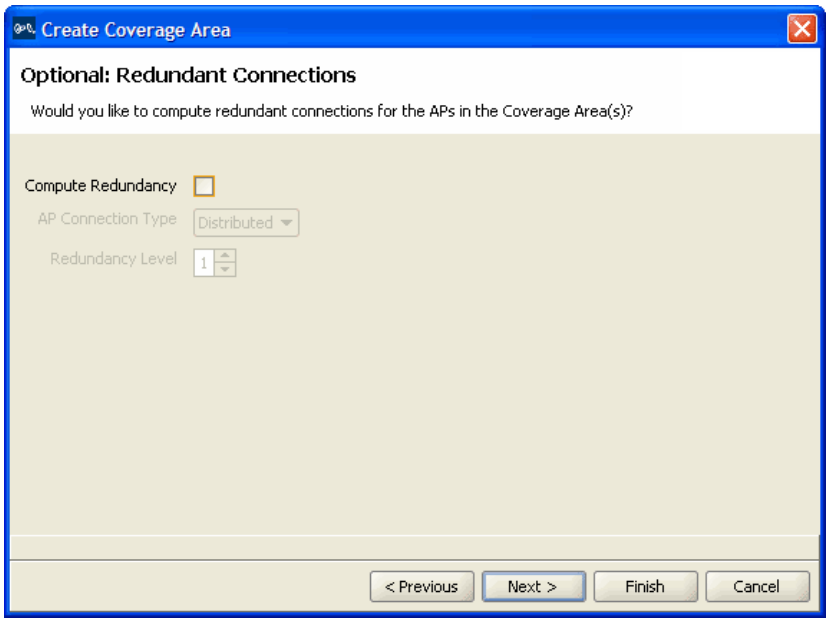
12 To change the default WX switch model, select the model from the WX Model list.

13 To change the default MAP model, select the model from the Default AP Model list.

14 To change the MAP connection type, select the type from the AP Connection Type list:

- Direct—MAPs are directly attached to dedicated WX switch ports.
- Distributed—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices.
- Distributed (Auto)—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices. They receive their configuration automatically using a profile that assigns a Distributed MAP number and name to the MAP from among the unused valid MAP numbers available on the switch.

15 Click **Next**. If you selected Direct or Distributed in the AP Connection Type list, the Redundant Connections page appears; go to step 16. If you selected Distributed (Auto) in the AP Connection Type list, the Capacity Planning for Data page appears; go to step 21.



16 To plan for redundant MAP connections to WX switches, select **Compute Redundancy**.

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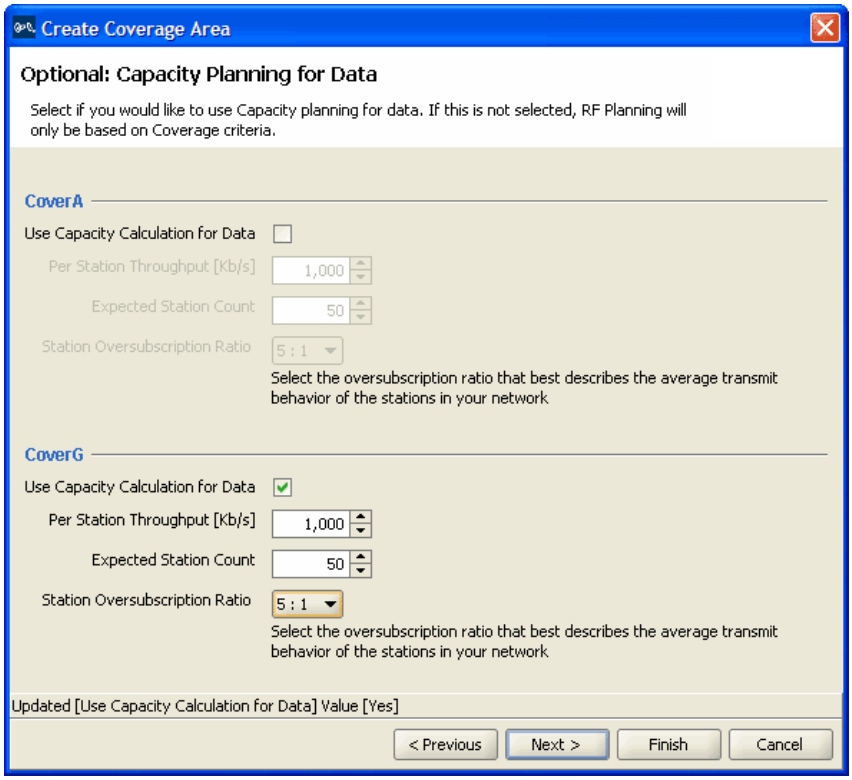
17 To change the MAP connection type for the redundant connection, select **Direct** or **Distributed** from the MAP Connection Type list.

18 To change the number of redundant connections for the distributed connection type, type the number in the Redundancy Level box.

19 For direct connections, the redundancy level is always 1.

20 Click **Next**. The Capacity Planning for Data page appears.


Create Coverage Area
Optional: Capacity Planning for Data
Select if you would like to use Capacity planning for data. If this is not selected, RF Planning will only be based on Coverage criteria.
CoverA
Use Capacity Calculation for Data
Per Station Throughput [Kb/s]
1,000
Expected Station Count
50
Station Oversubscription Ratio
5 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the stations in your network
CoverG
Use Capacity Calculation for Data
Per Station Throughput [Kb/s]
1,000
Expected Station Count
50
Station Oversubscription Ratio
5 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the stations in your network
Updated [Use Capacity Calculation for Data] Value [Yes]
< Previous
Next >
Finish
Cancel

21 To calculate MAP placement and configuration based on both coverage and on capacity, enable **Use Capacity Calculation for Data**. Otherwise, click **Next** and go to step 25.

By default, 3WXM performs only the coverage calculation. If you enable the **Use Capacity Calculation for Data** option, 3WXM performs both calculations.

22 In the Per Station Throughput list, specify the throughput (combined transmit and receive) in kilobits per second (Kbps) for a station.

23 In the Expected Station Count list, specify the number of clients you expect to be in the coverage area.

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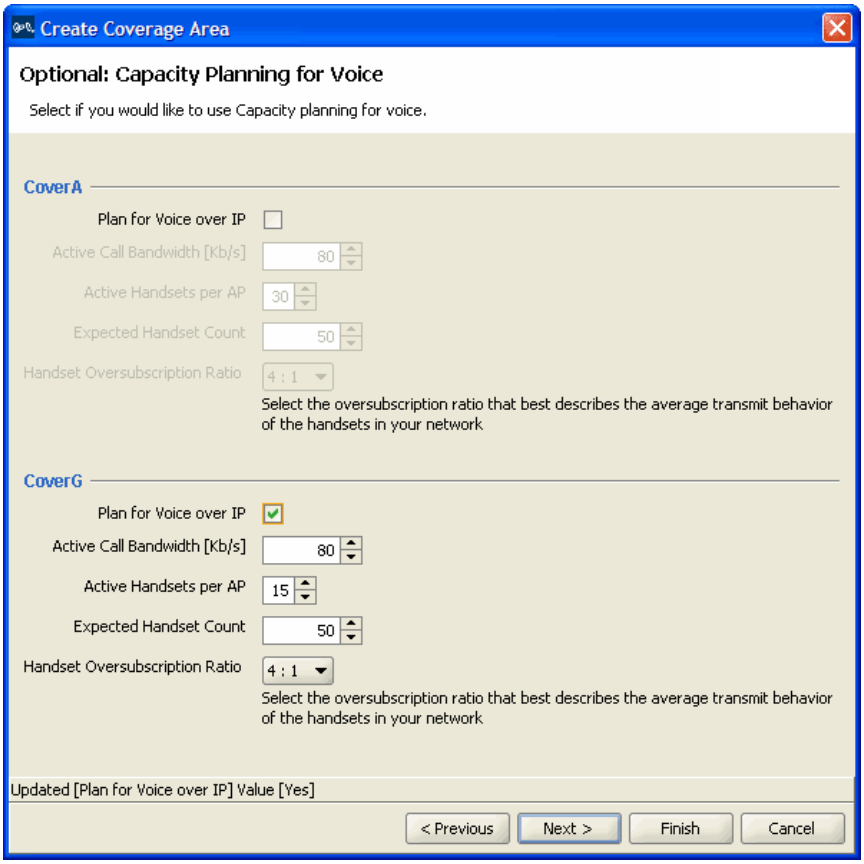
24 In the Station Oversubscription Ratio list, select the ratio for the average transmit behavior of the stations.

The station oversubscription ratio is the ratio of active clients compared to total clients. For example, the ratio 5:1 indicates that, statistically, 20 percent of the clients are active at any given time.

25 Click **Next**. The Capacity Planning for Voice page appears.


Create Coverage Area
Optional: Capacity Planning for Voice
Select if you would like to use Capacity planning for voice.
CoverA
Plan for Voice over IP
Active Call Bandwidth [Kb/s]
80
Active Handsets per AP
30
Expected Handset Count
50
Handset Oversubscription Ratio
4 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the handsets in your network
CoverG
Plan for Voice over IP
Active Call Bandwidth [Kb/s]
80
Active Handsets per AP
15
Expected Handset Count
50
Handset Oversubscription Ratio
4 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the handsets in your network
Updated [Plan for Voice over IP] Value [Yes]
< Previous
Next >
Finish
Cancel

26 To calculate MAP placement and configuration based on both coverage and on capacity for voice over IP, enable **Use Capacity Calculation for Voice**. Otherwise, click **Next** and go to step 31.

By default, 3WXM performs only the coverage calculation. If you enable the **Use Capacity Calculation for Voice** option, 3WXM performs both calculations.

27 In the Active Call Bandwidth list, specify the amount of bandwidth in kilobits per second (Kbps) that you expect for each call.

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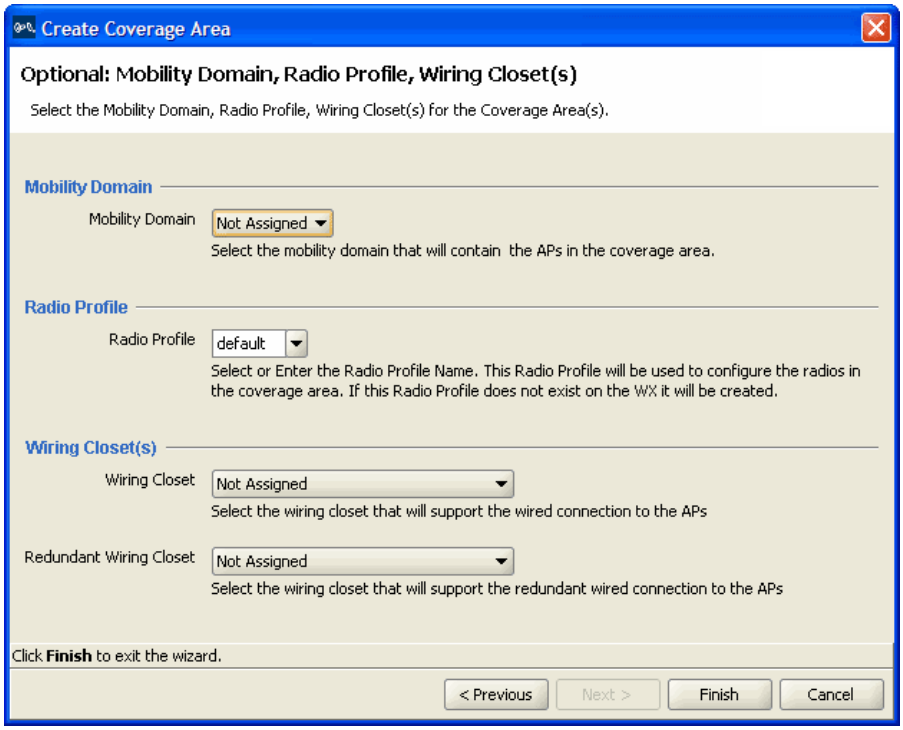
28 In the Active Handsets per AP list, specify the number of voice over IP phones that you want each MAP to handle.

29 In the Expected Handset Count list, specify the number of voice over IP phones you expect to be in the coverage area.

30 In the Handset Oversubscription Ratio list, select the ratio for the average transmit behavior of the voice over IP phones.

The handset oversubscription ratio is the ratio of active handsets compared to total handsets. For example, the ratio 4:1 indicates that, statistically, 25 percent of the voice over IP phones are active at any given time.

31 Click **Next**. The Mobility Domain, Radio Profile, Wiring Closet(s) page appears.


Create Coverage Area
Optional: Mobility Domain, Radio Profile, Wiring Closet(s)
Select the Mobility Domain, Radio Profile, Wiring Closet(s) for the Coverage Area(s).
Mobility Domain
Mobility Domain
Not Assigned
Select the mobility domain that will contain the APs in the coverage area.
Radio Profile
Radio Profile
default
Select or Enter the Radio Profile Name. This Radio Profile will be used to configure the radios in the coverage area. If this Radio Profile does not exist on the WX it will be created.
Wiring Closet(s)
Wiring Closet
Not Assigned
Select the wiring closet that will support the wired connection to the APs
Redundant Wiring Closet
Not Assigned
Select the wiring closet that will support the redundant wired connection to the APs
Click Finish to exit the wizard.
< Previous
Next >
Finish
Cancel

32 In the Mobility Domain list, select the Mobility Domain that contains the MAPs used for this coverage area.

33 In the Radio Profile list, select the radio profile used for this coverage area.

The profiles available depend on the Mobility Domain you selected in step 32. The profile you select applies to all radios associated with the coverage area. If you type the name of a radio profile that does not already exist, 3WXM creates it.

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34 In the Wiring Closet list, select the wiring closet that contains the WX switch or switches to be connected to the shared MAPs.

If the MAPs will be directly connected to WX switches, a wiring closet is required. If all the MAPs in the coverage area will be indirectly connected to WX switches through the network, a wiring closet is not required.

35 In the Redundant Wiring Closet list, select the wiring closet that will provide redundant connection to the MAPs. This is required for directly connected MAPs, if you require the MAPs to have redundant connections. Otherwise, this is not required.

36 Click **Finish** to complete the wizard and create the coverage area. The coverage area is now displayed on your floor.

Compute and Place MAPs

When you perform the Compute and Place procedure for one or more coverage areas, 3WXM automatically calculates the number of MAPs you require and places them in appropriate locations on the floor. To do this, two calculations are performed in 3WXM. One is based on capacity (traffic engineering) and the other is based on pure RF coverage (at a given data rate).

After the calculations are performed, the number of MAPs from capacity and the number of MAPs from coverage are compared, and the bigger count "wins." If capacity wins, a grid pattern of MAPs is established. The MAP coverage positions are reused, with the excess MAPs remaining in their original grid position.

Using a "clean" RF model is imperative for best results. If you have many parallel RF obstacles that are close together, the placement algorithm tends to add more MAPs than are required. So, even with the automatic clean layout mechanism in 3WXM, complex drawings demand additional pruning and isolation of single RF obstacles objects to keep the RF obstacle count as low as possible. For more information about cleaning your floor plans, see "Clean Layout" on page 130.

When you are performing Compute and Place for a coverage area for the first time, the results do not account for existing MAPs. Manual overrides of the MAP results are not taken into account if you perform Compute and Place again.

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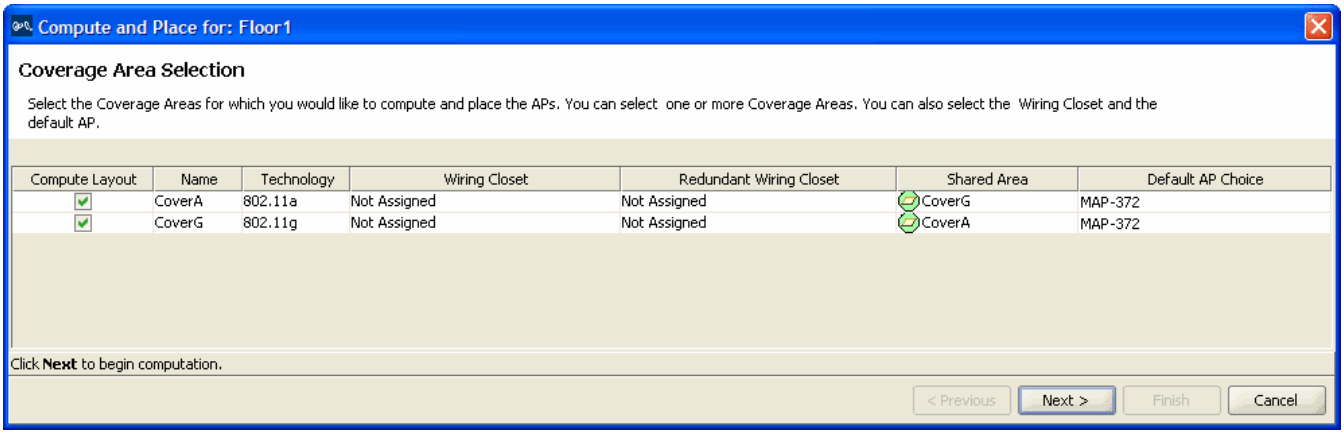
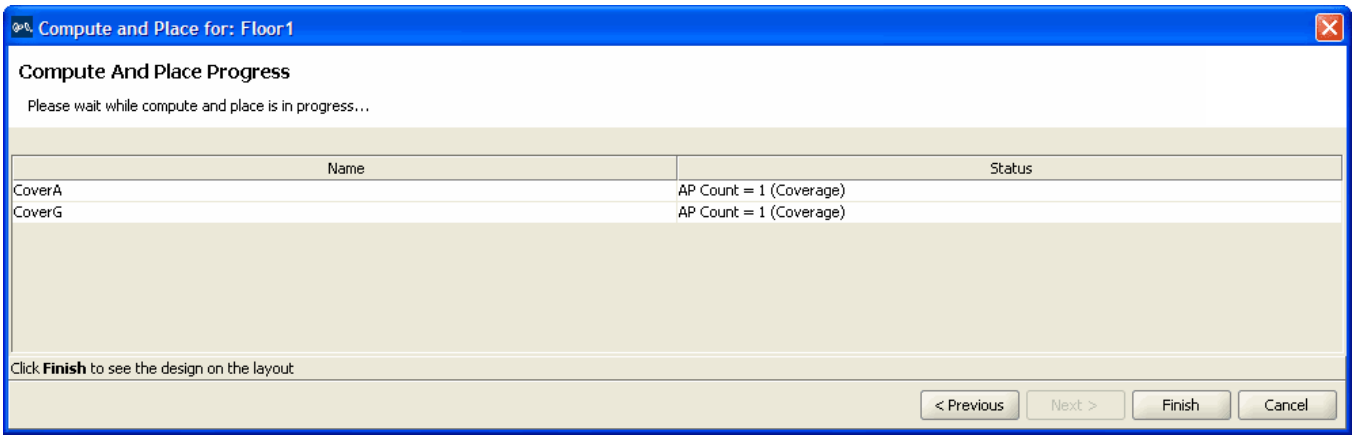
To determine the number and placement of MAPs

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **RF Planning**.
3. Under RF Planning, click **Compute and Place**. The Compute and Place wizard appears.



4. To remove a coverage area from MAP placement and computation, clear the area's Compute Layout box.
5. To specify the primary wiring closet for a coverage area, click in the Wiring Closet column to display the wiring closet list and select a wiring closet from the list.
6. Click **Next**. The Coverage Area Progress page appears. Information is shown about the number of MAPs per coverage area, and whether they were placed based on coverage or capacity.



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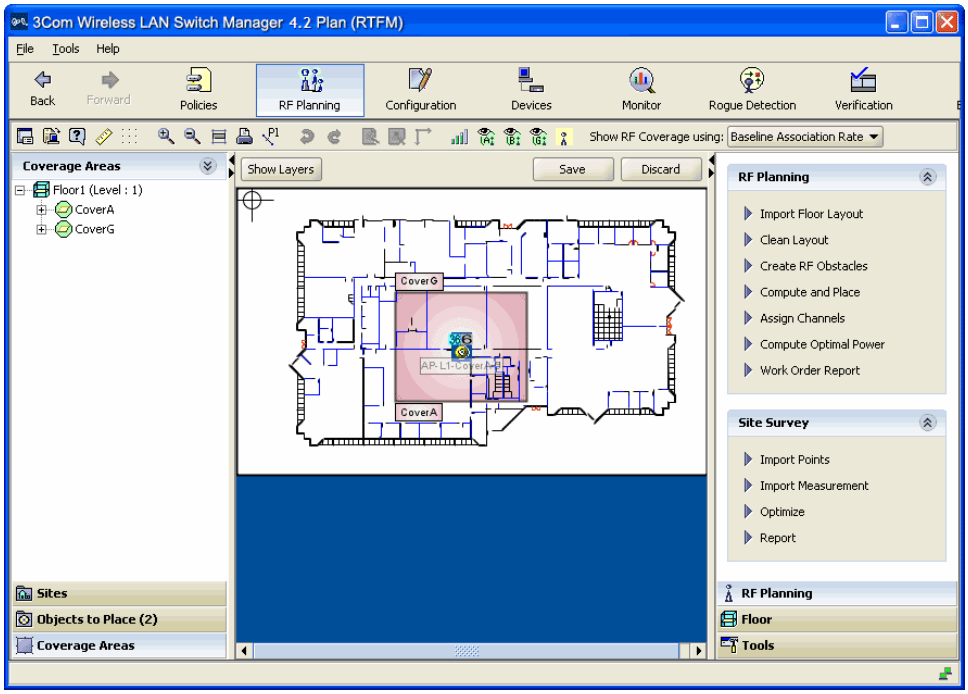
7 Review the number of MAPs required for each coverage area, and the overriding criterion used (coverage or capacity).

8 Click **Finish** to apply the changes. Icons for the suggested MAP locations appear on the floor plan.



Assign Channel Settings

After identifying the MAPs required for a coverage area, you need to assign channels to the MAPs. Appropriate assignment of channels across the floor minimizes co-channel interference. The channel assignment algorithm assigns non-overlapping channels to neighboring APs from the selected channel set. Choose the starting floor and the ending floor (in the downward direction) for multi-floor channel assignment. The algorithm takes predicted RSSI values between neighboring MAPs (including MAPs on different floors and 3rd party APs) and minimizes same-channel assignments between APs. You can specify cross-floor attenuation and the 802.11 technology on which you want to perform the channel assignment. 3WXM uses predicted RSSI values for the imaginary "ray" that is drawn between two MAPs. Consequently, you may see unexpected results if the exact path between the MAPs has many obstacles, but the areas around that path are relatively open. You can make further manual adjustments, if necessary.

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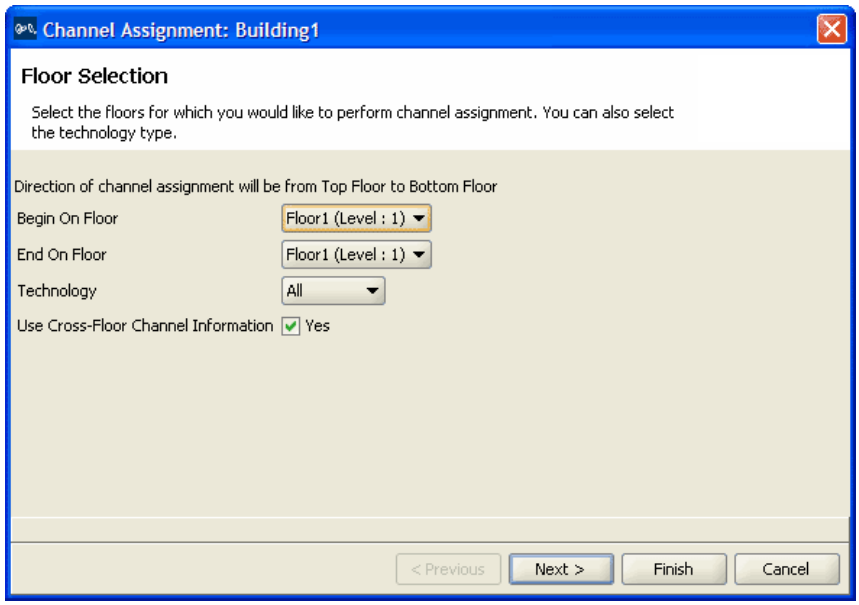
To assign channels

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **RF Planning**.
3. Under RF Planning, click **Assign Channels**. The Channel Assignment wizard appears, showing the current channel assignment constraints.


Channel Assignment: Building1
Floor Selection
Select the floors for which you would like to perform channel assignment. You can also select the technology type.
Direction of channel assignment will be from Top Floor to Bottom Floor
Begin On Floor
Floor1 (Level : 1)
End On Floor
Floor1 (Level : 1)
Technology
All
Use Cross-Floor Channel Information
Yes
< Previous
Next >
Finish
Cancel

4. To change the starting floor for channel assignment, select the floor from the Begin On Floor List. By default, 3WXM starts at the top floor and works down.
5. To change the ending floor for channel assignment, select the floor from the End On Floor List.

   The ending floor number must be lower than or equal to the starting floor number.
6. To change the radio type for which to assign channels, select the radio type from the Technology list. By default, 3WXM assigns channels for all radio types on the MAPs placed in the building.
7. To prevent 3WXM from taking the channel assignments for the floor above into account when calculating the channel assignments for a floor, clear **Use Cross-Floor Channel Information**.
8. Click **Next**. The Channel Assignment Progress page appears.

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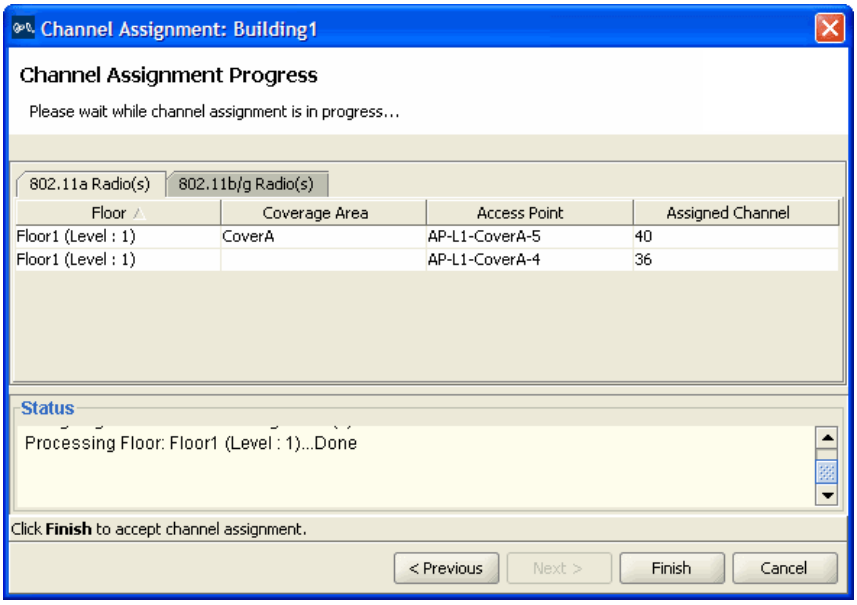
9 Review the results. The 802.11a channel assignments are listed on the 802.11a Radio(s) tab. The 802.11b/g channel assignments are listed on the 802.11b/g Radio(s) tab.



10 Click **Finish** to accept the channel assignments.

The new channel assignments are reflected in the Coverage Areas panel.

Calculate Optimal Power

The Compute and Place procedure is performed using the maximum allowed power for the selected channel set in the defined regulatory domain. Optimal power can be computed for each MAP, where transmit power is adjusted (up or down) to provide adequate coverage with minimum RF interference.

When calculating optimal power, you can manually change positions and counts of MAPs (add or remove MAPs) before the final power optimization is performed. Changing MAP quantities and positions is quite typical, given that an operator can interpret the floor plan and understand any cabling constraints to avoid any positioning problems.

Transmit power levels must be high enough to adequately cover an area, but also low enough to minimize co-channel interference. 3WXM factors in these considerations when calculating optimal power.

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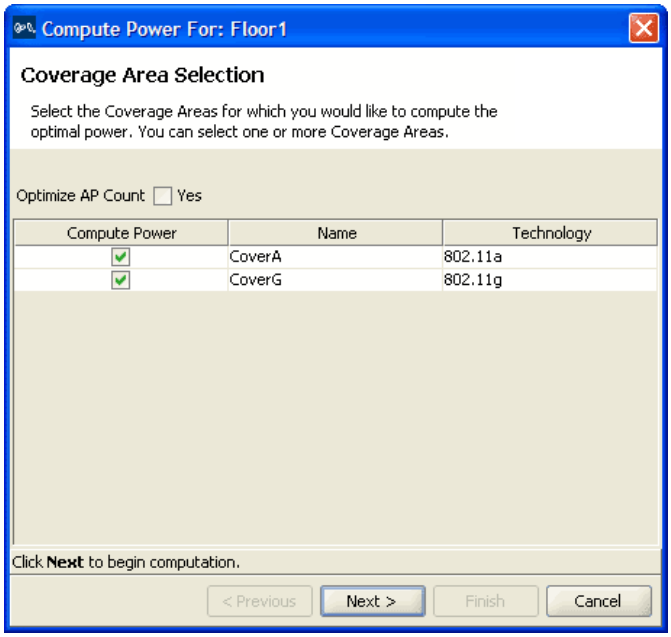
To calculate optimal power

1. In the Task List panel, click **RF Planning**.
2. Under RF Planning, click **Compute Optimal Power**.

   The Compute Power For wizard appears, showing a list of the areas you defined and the corresponding technology.



3. To optimize the AP count, select **Optimize AP Count**. This option checks for coverage overlaps and removes an MAP if neighboring MAPs provide enough coverage to make the MAP unnecessary.
4. Select **Compute Power** for the areas for which you want to compute power.
5. Click **Next**. The Compute Power For Progress page appears. Click **Finish** to see the results.

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Display Coverage

Looking at the RF coverage allows you to see if the entire area is adequately covered by the MAPs. You can move the MAPs and see how the coverage changes.

To display the RF coverage for an area

1. Beside **Show RF Coverage Using**, select how you want to display the coverage:
   - Baseline Association Rate—Coverage is shown based on the MAP radio baseline association rate. The baseline association rate is the typical data rate the radio is expected to support for client associations. (The baseline association rate is specified during planning, on a coverage area basis.)
   - Data Rate—Coverage is shown in colored bands that represent each of the data transmit rates supported by the radio. These rates are standard for each radio type.
   - RSSI—Coverage is shown based on the received signal strength indication (RSSI) of the radio's signal heard by other radios.
2. Right-click on a coverage area and select **Show RF Coverage**.
3. Select the **A**, **B**, or **G** icon from the toolbar to view the coverage area for that technology.

   The coverage area is displayed, color-coded by channel.

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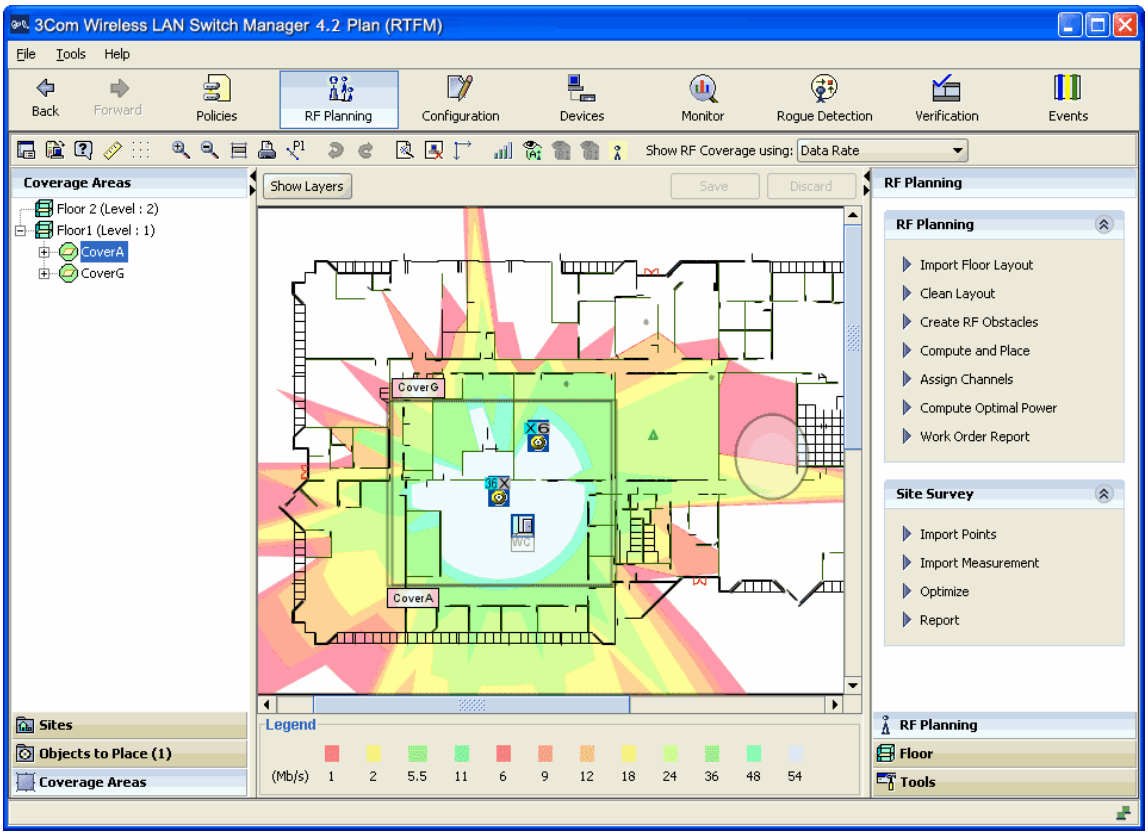

If the coverage area provided by a MAP on the floor above or below is one meter or less, 3WXM displays a message. This coverage area is not displayed on the floor plan.

Generate a Work Order

You can generate a work order as part of your wireless network planning. The work order provides all of the necessary information for the physical installation of the 3Com Mobility System. A work order shows where the MAPs should be installed, WX initial setup configuration information, and projected RSSI information that is useful when verifying the installation.

To generate a work order

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **RF Planning**.
3. Under RF Planning, click **Work Order Report**. The Work Order Generation dialog is displayed.

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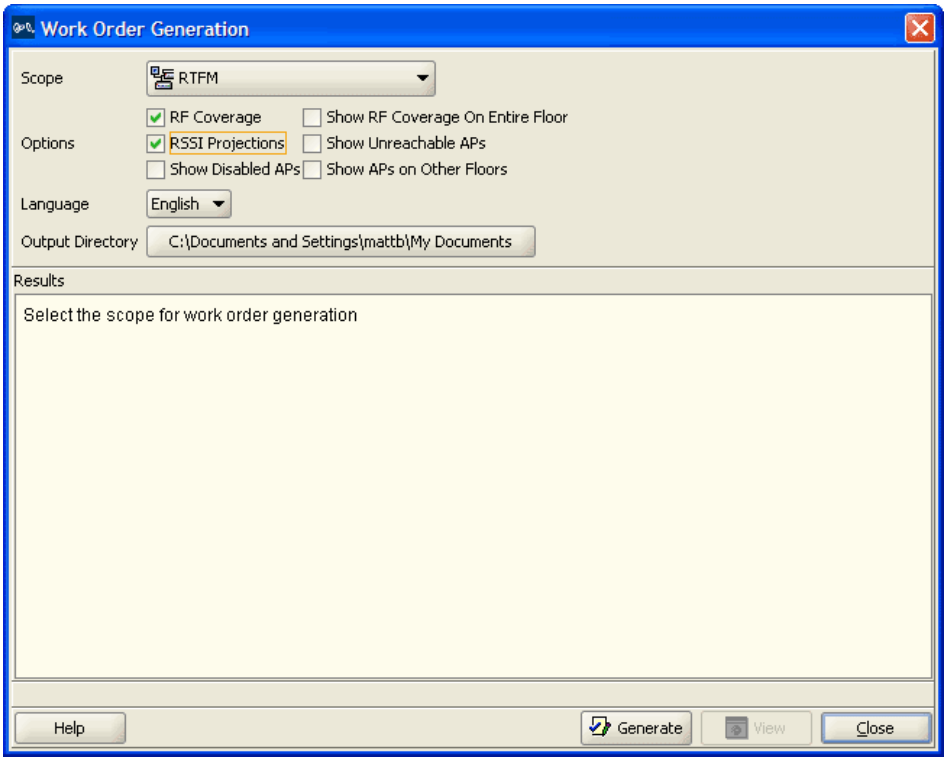

4 Specify the work order options.

5 In the Language list, select **English** or **German**.

The language you select is the language used when you next access this page.

6 To select the directory to which the work order report is saved, click **Choose**. The **Select** dialog box appears.

7 Click **Generate**.

The work order is saved in the directory you specified in the format WO_*scope_name_date*. If you generate another order for the same scope on the same day, the old work order is overwritten.

When the work order has been generated, the **View** button becomes available.

8 Click **View**. A browser window opens to display the work order in HTML format.

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Install the Equipment

After you print the work order from 3WXM, you can distribute it to your installers. The work order shows where to install the 3Com equipment. If you have specified third-party APs in the network plan, those will be considered in the work order, too.

For more information about installing the equipment, see "Equipment Installation" on page 42.

What's Next?

A 3WXM network plan can support both RF Auto-Tuning and RF Planning techniques at the same time. You can use RF Auto-Tuning to meet the demands of rapid network changes that can be caused by a greater or lesser number of users, or by a physical blockage of MAPs. You are alerted when changes occur in your network of this nature.

- To fine tune your network's RF coverage area and performance, see "Optimizing a Network Plan" on page 179.
- To deploy your network plan and enable and configure monitoring, see "Managing and Monitoring Your Network" on page 155.

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7 Managing and Monitoring Your Network

This chapter provides information to help you deploy the services you configured for your wireless network, enable communication between a 3WXM client and 3WXM Services, and enable and configure monitoring. This chapter also provides three monitoring examples you can use as a guide to troubleshooting user connectivity issues in your network, and provides you with information about configuring WX switch management services and performing specific administrative tasks

For an overview of the types of monitoring available in 3WXM, see "Management and Monitoring" on page 43.

For detailed information about monitoring, see the chapter "Monitoring the Network" in the *Wireless LAN Switch Manager Reference Manual*.

For detailed information about performing administrative tasks on a WX switch, see the chapter "Configuring WX System and Administrative Parameters" in the *Wireless LAN Switch Manager Reference Manual*.

Deploy Your Configuration

Any changes you make to your network in 3WXM are saved in the network plan on the server, but the changes are not applied to your network until they are deployed. You see the changes in 3WXM, but the changes are only in the network plan. To implement the changes in the live network, you must deploy them to the WX switches in the network. You can easily apply a configuration to multiple WX switches, or deploy changes to a single WX switch.

3WXM allows you to deploy changes immediately or schedule deployment of the changes.

To immediately deploy local changes

1. Select the Devices tool bar option.
2. At the bottom of the Task List panel, select **Change Management**.

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3 Select one or more WX switches.

To select multiple switches, press **Shift** (for contiguous switches) or **Control** (for noncontiguous switches) while clicking.

4 In the Local Changes group in the Task List panel, click **Deploy**. The Deploy Configurations dialog box appears.

The dialog lists the switches that have configuration changes.

5 Select the switches to which you want to deploy the changes.

To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.

6 Click **Deploy**.

The deployment status for each affected WX is shown in the History window at the bottom left of the dialog box.

3WXM performs verification of the changes. If errors occur, they are listed in the Selected Errors at the bottom right of the dialog box. If there are errors, fix them and verify the changes before trying to deploy again. (You can use the Verification tab to fix the errors.)

If the deploy is successful, 3WXM also instructs the WX switch to save the changes in its configuration file.

7 Click **Close**.

*You can click **Close** at any time after clicking **Deploy**. The operation continues in the background. To review the status of the operation, use the operation log. (Select View Operation Log.)*

To schedule deployment of local changes

1 Select the Devices tool bar option.

2 At the bottom of the Task List panel, select Change Management.

3 Select one or more WX switches.

To select multiple switches, press **Shift** (for contiguous switches) or **Control** (for noncontiguous switches) while clicking.

4 In the Task List panel in the Local Changes group, click **Schedule Deploy**. The Schedule Deploy dialog box appears.

5 Edit the start date and time.

(The date and time are based on the date and time on the machine where 3WXM Services is installed.)

6 Click **OK**.

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To verify your deployment

1 Leave the Devices tool bar option selected.

2 Look in the Deploy Status column for the switch(es) to which you deployed configuration information. The status should be *Deploy Completed*.

You also can verify successful deployment by checking the operation log. To access the log:

1 Select the Devices tool bar option.

2 At the bottom of the Task List panel, select **Device Operations**.

3 In the Task List panel, select **View Operation Log**.

Perform Basic Administrative Tasks

This section contains information about basic administrative tasks you can perform in 3WXM.

For detailed information about performing administrative tasks including configuring WX switch management services, see the chapter "Configuring WX System and Administrative Parameters" in the *Wireless LAN Switch Manager Reference Manual*.

For more information about image and file management, see the chapter "Managing WX System Images and Configurations" in the *Wireless LAN Switch Manager Reference Manual*.

Configuring WX Management Services

You can configure the following information and management services for the WX switch:

- System information—You can specify system contact information, as well as the CLI prompt and the banner message that appears at each session.
- HTTPS—By default, HTTPS is enabled. TCP port 443 is used for secure access by Web Management, the 3Com Web-based application for managing a WX switch.

3WXM communications also use HTTPS, but 3WXM is not affected by the HTTPS configuration on the WX. For 3WXM, HTTPS is always enabled and listens to port 8889.

- Telnet—By default, Telnet is disabled. You can enable Telnet for unencrypted access to the CLI.

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- SSH—By default, SSH is enabled. You can use SSH for encrypted access to the CLI.
- SNMP—By default, SNMP is disabled. You can configure SNMP community strings and User Security Model (USM) users, notification profiles, and notification targets.
- Logging—The system log provides event information for monitoring and troubleshooting. You can send the log information to a local data buffer on a WX, to the console, to a Telnet session, and to a configured set of syslog servers.
- Tracing—Tracing allows you to review diagnostic information for debugging MSS. Tracing allows you to review messages about the status of a specific area of MSS.
- Time zone and summertime settings—You can configure the system time and date statically. You also can configure MSS to offset the time by an additional hour for daylight savings time or similar summertime period.

To manage services on a WX switch

1. Select the Configuration tool bar option.
2. In the Organizer panel, click the plus sign next to the WX switch.
3. Click the plus sign next to System.
4. Select Management Services.

   The management services and their settings appear in the Content panel.
5. Use the Content panel and Task List options to modify settings.

   (For information about the management options, see the "Viewing and Changing Management Settings" section in the "Configuring WX System Parameters" chapter of the *Wireless LAN Switch Manager Reference Manual*.)

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Distributing System Images

You can use 3WXM to upgrade or downgrade the system image (MSS software) on WX switches. System images include switch software and MAP software.

Using the Image Repository

Use the image repository to add or delete WX system images. The image file is checked and its version is verified when added to the image repository. Images are stored in the *3Com_installation_directory*\images\dp directory.

To add a system image

1. Select the Devices tool bar option.
2. At the bottom of the Task List panel, select Device Operations.
3. In the Task List panel, select Image Repository.
4. Click **Add Image**. The Add to Repository dialog box appears.
5. Navigate to the directory containing the system image.
6. Select the system image.
7. Click **Add to Repository**. The image is added to the image repository and appears in the Image List.
8. To close the Image Repository dialog box, click **Close**.

To delete a system image

1. In the Image Repository dialog box, select the image you want to delete.
2. Click **Remove Image**. A prompt appears.
3. Click **Yes** to delete the system image.
4. To close the Image Repository dialog box, click **Close**.

Distributing System Images

You can distribute a system image to one or more WX switches in a network plan.

To use a new system image, you must reboot the WX.

3Com recommends that you use the Verification tab to resolve any configuration errors or warnings before you distribute system images.

Before you can distribute an image, you must add it to the image repository. (See "Using the Image Repository" on page 159.)

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To immediately install an image on WX switches

1. Select the Devices tool bar option.
2. At the bottom of the Task List panel, select Device Operations.
3. In the Managed Devices list, select the WX switches onto which you want to install the image.

   To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.
4. In the Task List panel, select Image Install.
5. Click on Select an Image to display the list of images in the repository.
6. Select the image and click **Install**.

To schedule installation of an image on WX switches

1. Select the Devices tool bar option.
2. At the bottom of the Task List panel, select Device Operations.
3. In the Managed Devices list, select the WX switches onto which you want to install the image.

   To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.
4. In the Task List panel, select Schedule Install.
5. Click on Select an Image to display the list of images in the repository.
6. Click **Next**.
7. Edit the start date and time.

   (The date and time are based on the date and time on the machine where 3WXM Services is installed.)
8. Click **Finish**.

Saving Versions of Network Plans

You can save multiple versions of a network plan. After deploying a network plan to a WX switch, you can save a snapshot of the plan as a version. Create versions of the network plan on a regular basis and at every major baseline event for network configurations. Doing so allows you to have snapshots of network configurations should you need to revert to one of them.

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If you need to roll back configuration changes, you can use a saved version to roll back the system software image and configuration files to a known state. Before you can save a version of a network plan, you need to deploy and save the network plan. Versions of network plans are saved in the db/xml/versions directory in the 3WXM installation directory.

After you have saved a version of a network plan, the version appears in the list of network plans available to open. If you open a version of a network plan, you are asked whether you want to deploy it or open it. When the version is open, you see its version name in the title bar of the main 3WXM window.

To save a version of a network plan

1. Select **File > Save As**.
2. Type a name for the plan. Make the name descriptive. For example, name the plan *HappyVille_4_0_1*.
3. Click **Next**. The status of the saving process appears.
4. Click **Finish**.

Saving Network Plans Automatically By default, 3WXM uses the autosave feature to automatically save changes to a network plan at regular intervals while you are working.

To view or modify backup settings, select **Tools > 3WXM Services Backup/Restore**. The Backup/Restore dialog appears.

Importing and Exporting Switch Configuration Files

You can import or export switch configuration files in Extensible Markup Language (XML) format.

- The import option enables you to create a WX switch in the network plan by importing configuration files in Extensible Markup Language (XML) format. You also can update the configuration of a switch that is already in the plan.
- The export option enables you to save a switch's configuration to an XML file. After exporting a WX configuration to an XML file, you can import it to another instance of 3WXM or use it as a backup copy.

If you import a configuration containing information that an older version of 3WXM or MSS does not support, the information is ignored when the configuration is imported.

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If you import a switch configuration, you must enable 3WXM management of the switch before you can deploy the switch to the network. (To enable 3WXM management of a switch, select the switch in the Organizer panel, select Managed, then click **Save**.)

To import a configuration

1. In the main 3WXM window, select **File > Import**. The Import Configurations dialog box appears.
2. In the Import Into Mobility Domain group box, select one of the following options:
   - Click **Use File Info** to import the configuration information using the Mobility Domain specified in the configuration file.
   - Click **Select** to specify a Mobility Domain to import configuration information to. Then select the Mobility Domain from the list.
3. To replace existing WX switch information in 3WXM with information from the configuration file, select **Update existing WXs**.
4. Click **Select Files**. The Select Files To Import dialog box appears.
5. Select one or more configuration files to be imported. To make multiple selections, press **Shift** (for contiguous items) or **Control** (for noncontiguous items) while clicking items.
6. Click **Select Files To Import**. The file or files you selected appear in the File Import Results list.
7. To remove all the files you previously selected, click **Clear Files**.
8. Click **Import**. The status of the import process appears in the Status column.
9. Click **Close** to save the changes.
10. Enable 3WXM to manage the switch. (Select the switch in the Organizer panel, select Managed, then click **Save**.)

To export a configuration

1. Select **File > Export**. The Export Configurations dialog box appears.
2. In the Export From list, select the Mobility Domain whose configuration you want to export.
3. If you want to export the configuration file to a different directory, click the **Choose** button, which is labeled with the current output directory. The Select dialog box appears. Navigate to the directory you want to use as the output directory, and click **Select**.

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4 To overwrite previously exported configuration files, select **Overwrite Existing Files**.

   If you do not select this option, you cannot export a configuration file with the same name as an existing file in the output directory. You can rename the existing file or move the file to another directory.

5 To have 3WXM create a backup copy of a previous configuration file, select **Copy Files Before Overwriting**.

6 To include the default configuration commands in the exported file, select **Export Defaults**.

7 For each WX whose configuration you want to export, make sure the **Export** checkbox is selected.

8 Click **Export** to begin the exporting process. Messages appear in the Status column in the WX List box and the Results box.

   The configuration is saved in the directory that you specified.

9 To close the Export Configurations dialog box, click **Close**.

Monitoring Examples

3WXM provides many monitoring options. The section "Management and Monitoring" on page 43 provides an overview of all the monitoring tools available to you.

This section describes how you can use some of the monitoring tools to determine problems that are typically reported to a network operator.

The monitoring examples described in this section are based on the following scenarios:

- An individual user calls the help desk with the complaint that the network is very slow or inaccessible
- A group of users complain about network performance
- You want to monitor and eliminate a rogue AP

Monitor an Individual User

If an individual user notifies you with the complaint that the network is very slow or inaccessible, use the following steps to identify the problem:

1 Find the user. Place the user on a watch list.

2 Locate the user. (If you can locate them, then the scope of the problem can be narrowed down to performance.)

3 View the user's network activity.

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4 View statistics over a period of time. Placing the user on the watch list allows 3WXM to gather long-term statistics.

Find the User

You can find a user or multiple users based on the following criteria:

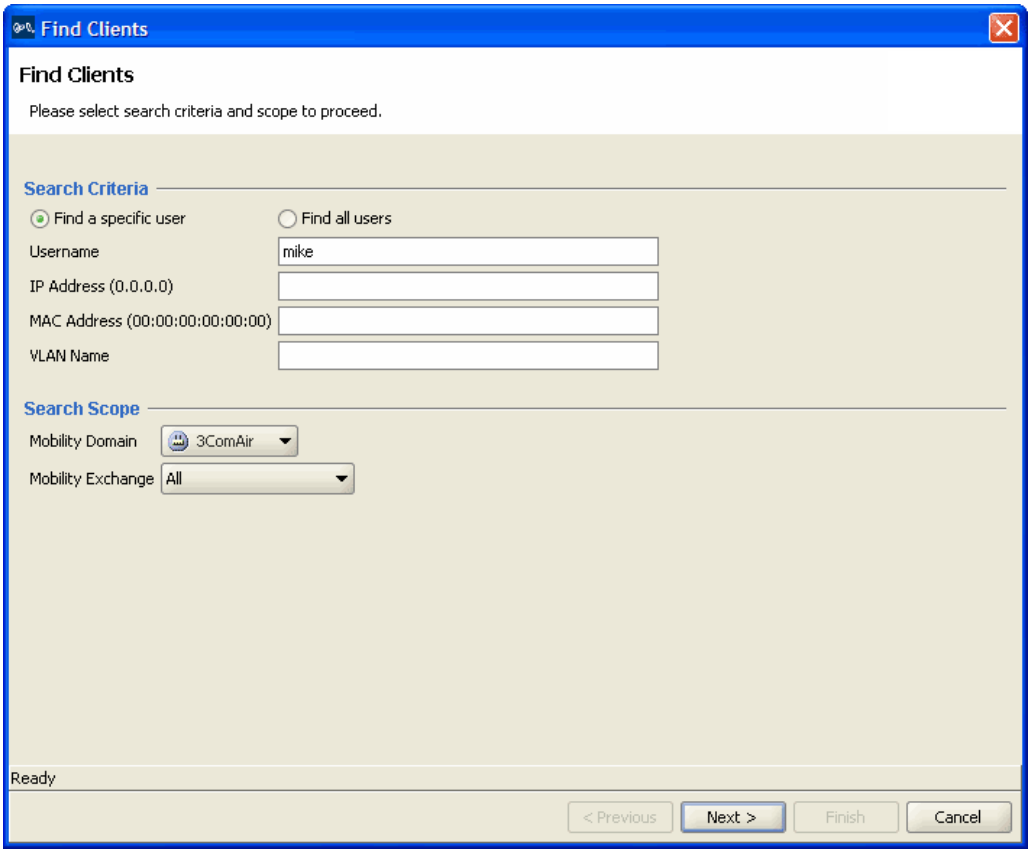
- Username
- MAC address
- IP address
- VLAN name

To find the user

1 Click on the Monitor option in the main 3WXM tool bar.

2 Select the Client Monitor view.

3 Click on the Client Monitor view's toolbar. The Find Clients dialog box appears.



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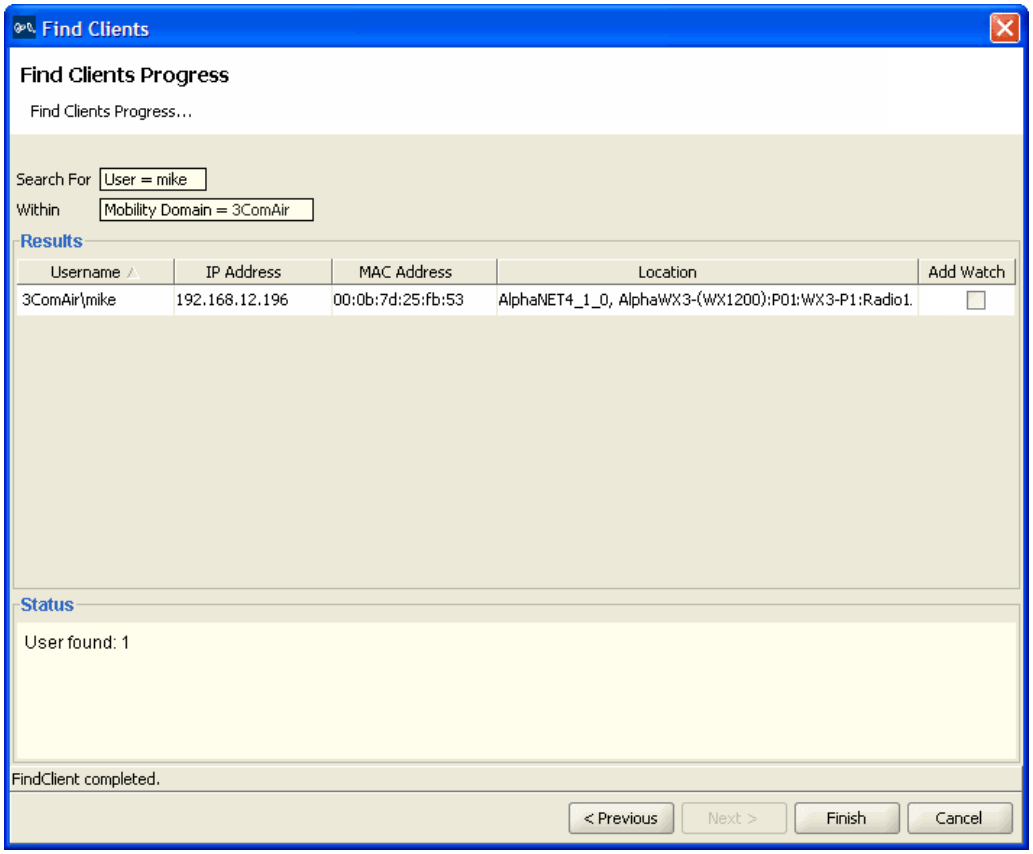
4 Enter the type of search you want to perform, and select the scope for the search.

5 Click **Next**. The search results appear.



Place User on Watch List

If viewing the user's current activity does not conclusively indicate the source of the problem, you can place the user on a watch list. Statistics polled for a watch list are gathered over time—up to 30 days. In this way, a pattern of events or statistics may be revealed, indicating the cause of the problem.

To place a user on the watch list

1 When the user is displayed in the search results, select the **Add Watch** checkbox in the user row.

2 Click **Finish**.

You can view the user's history for up to 30 days.

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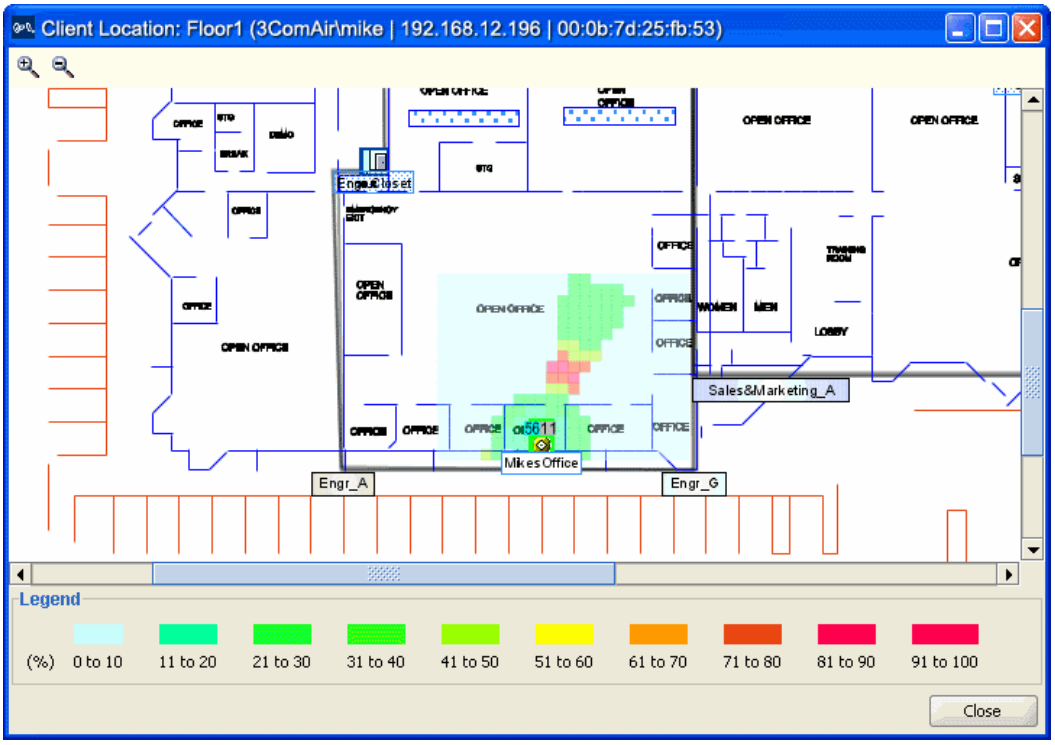
You can also add a user to the watch list by clicking the **Client Sessions** tab in the Client Monitor view, selecting the client, and clicking the icon on the toolbar.

Locate the User

You can display the user's approximate location by doing the following:

1. Click on the Monitor option in the main 3WXM tool bar.
2. Select the Client Monitor view.
3. Click on the **Client Sessions** tab.
4. Select the user; then click on the toolbar.

   The floor the client is currently on is displayed, as well as the client's likely location on the floor. The client is most likely in the vicinity of the area indicated by the red squares in the floor plan.



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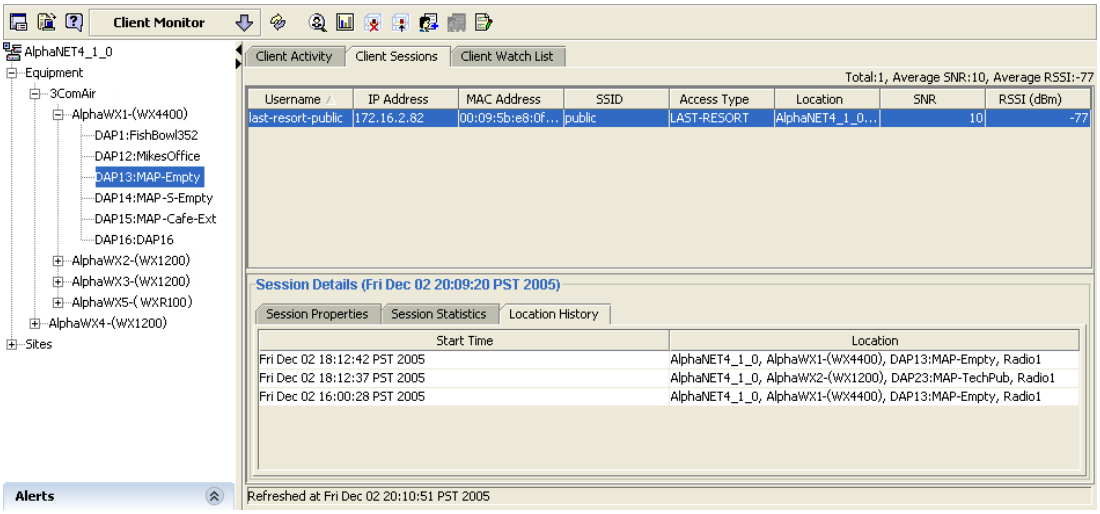
Display User Activity

You can display the event types displayed for the user. Disassociation events can occur, and users dropped from the network. These events can indicate the reason why access is barred or performance slow for the user. For example, typical authorization failures occur if the local database or RADIUS server fails to recognize a user.

To display user activity

1. Click on the Monitor option in the main 3WXM tool bar.
2. Select the Client Monitor view.
3. Click on the **Client Sessions** tab and select a user.
4. Select the **Location History** tab to see where the user has been. From here, you can determine the areas in the WLAN where interference is occurring.



View Long-Term User Statistics

If the user's complaint cannot be traced to a specific problem using current statistics, you can view user activity for the next 30 days.

To view long-term user statistics

1. Click on the Client Watch List tab and select the user.
2. In the Client Details section of the window, select **Trend: Lifetime AP Stats** to graph the watch list user's activity over all MAPs.

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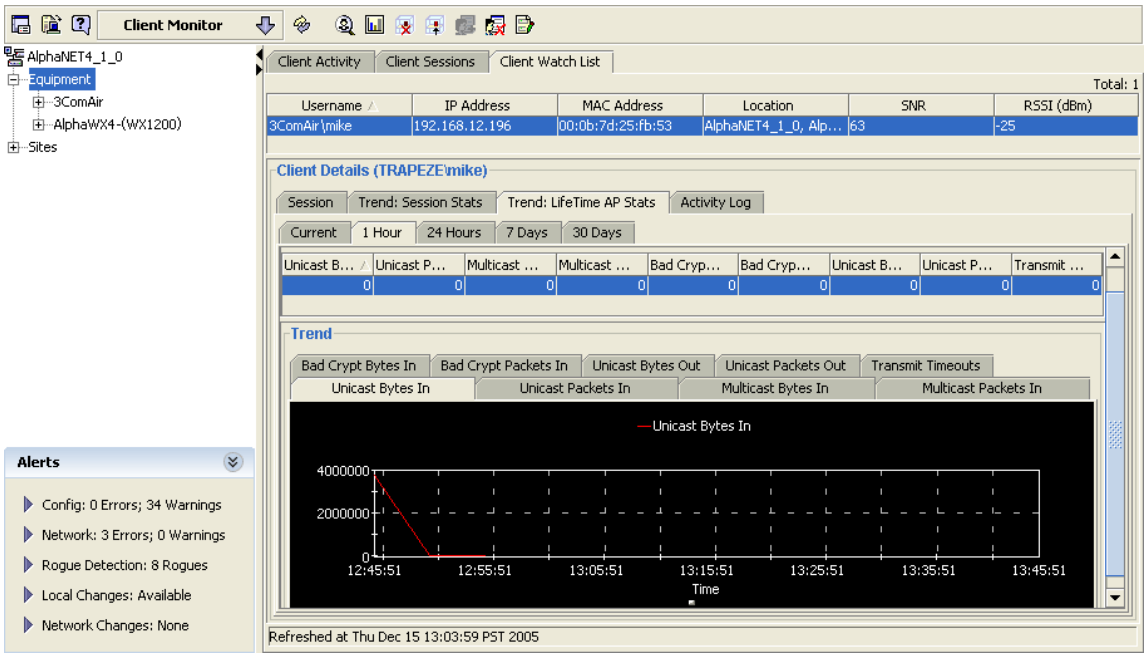
Using this data, you can determine whether the user's problem is interference due to low bandwidth (Unicast Bytes in).



3 Select the **Trend: Session Stats** tab to display Operational Rate, SNR, and RSSI statistics.

Signal to Noise Ratio (SNR) statistics can help you determine whether the interference is being created by too much noise on a channel. Receive Signal Strength (RSSI) statistics can indicate whether a low signal strength is creating the user's performance problem. Operational rate statistics display the throughput per second. The following throughput rates are optimum:

- 802.11b–11 Mb/s (optimum)
- 802.11g/a–36 Mb/s or higher

4 Select the **Session Statistics** tab to view statistics for the current MAP, or for all the MAPs to which the user has connected to the WLAN while on the watch list.

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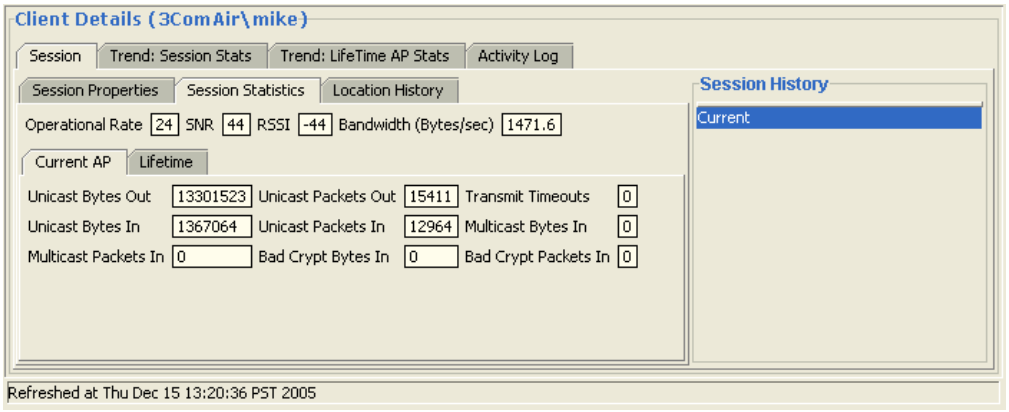
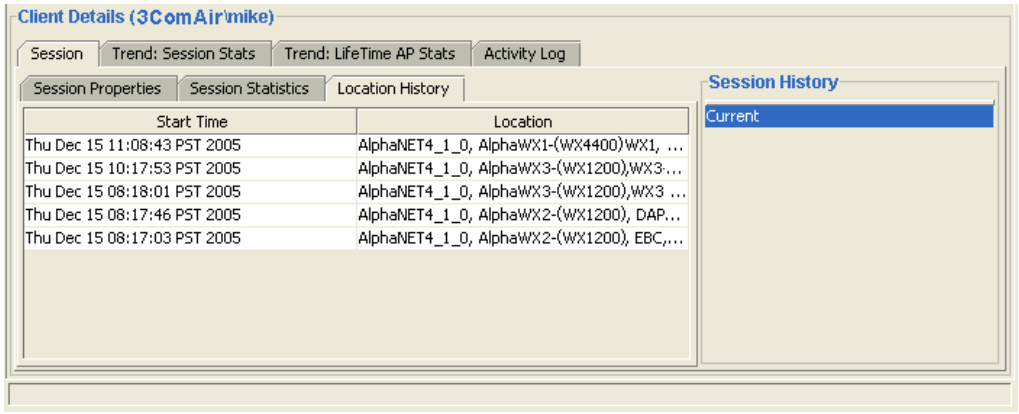

Client Details (3ComAir\mike)
Session
Trend: Session Stats
Trend: LifeTime AP Stats
Activity Log
Session Properties
Session Statistics
Location History
Session History
Current
Operational Rate 24 SNR 44 RSSI -44 Bandwidth (Bytes/sec) 1471.6
Current AP
Lifetime
Unicast Bytes Out 13301523 Unicast Packets Out 15411 Transmit Timeouts 0
Unicast Bytes In 1367064 Unicast Packets In 12964 Multicast Bytes In 0
Multicast Packets In 0 Bad Crypt Bytes In 0 Bad Crypt Packets In 0
Refreshed at Thu Dec 15 13:20:36 PST 2005

A high number of Transmit Timeouts for either the Current MAP or Lifetime of the user can indicate interference problems.

5 Select the **Location History** tab to view where the user has been roaming.



These statistics indicate whether interference problems are occurring in specific areas of the WLAN.

Monitor a Group of Users

If a group of users in a specific area of a floor notify you that they are experiencing poor performance, target a radio or multiple radios, and view the noise and events. RF statistics are found under the **RF Monitor** and **RF Trends** tabs.

To view the RF monitor statistics

1 Click on the Monitor option in the main 3WXM tool bar.

2 Select the RF Monitor view.

3 Expand the Equipment list in the Organizer panel, and select a radio.

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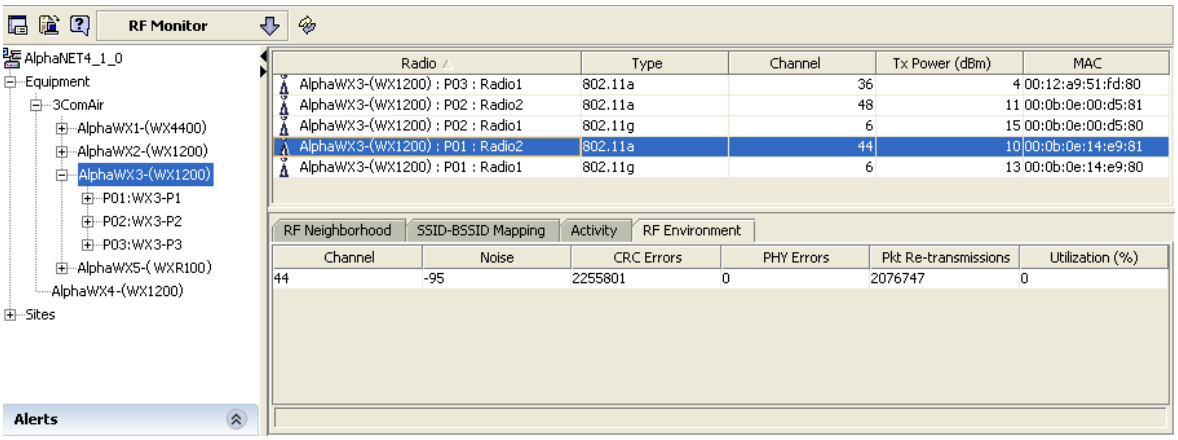
4 Select the **RF Environment** tab. Statistics are displayed.

High values for Noise can indicate a problem.

Also, view the Utilization statistics. If utilization is very high, this could prevent new users from gaining access to the WLAN.



To view trends

1 Click on the Monitor option in the main 3WXM tool bar.

2 Select the RF Trends view.

3 Expand the Equipment list in the Organizer panel, and select a radio.

You can view trends for a WX switch or a MAP.

4 View the Client Failures count.

A high count can indicate a problem with the radio.

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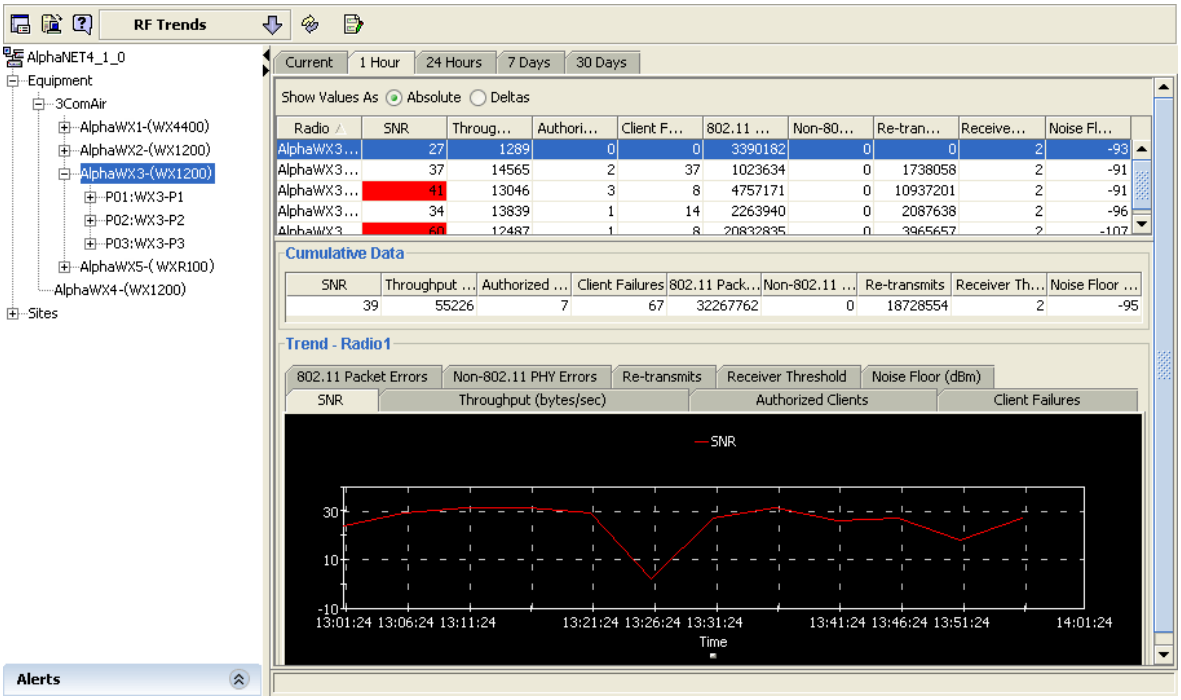

Monitor a Rogue

MAP radios automatically scan the RF spectrum for other devices transmitting in the same spectrum. The RF scans discover other 3Com radios, as well as third-party, non-3Com transmitters. MSS considers the non-3Com transmitters to be potential rogues, and places them on a rogue list.

A rogue access point is an access point that is not authorized to operate in your network. Rogue access points and their clients undermine the security of an enterprise network by potentially allowing unchallenged access to the network by any wireless user or client in the physical vicinity. Rogue access points and users can also interfere with the operation of your enterprise network. You can configure 3Com to automatically use countermeasures against rogue APs to disable them.

Not all access points placed on the rogue list are "hostile" rogues. You may want to move some of the access points from the rogue list to a known devices list or a third-party AP list. For more information about this topic as well as more detailed information about combatting rogues, see the chapter "Detecting and Combatting Rogue Devices" in the *Wireless LAN Switch Manager Reference Manual*.

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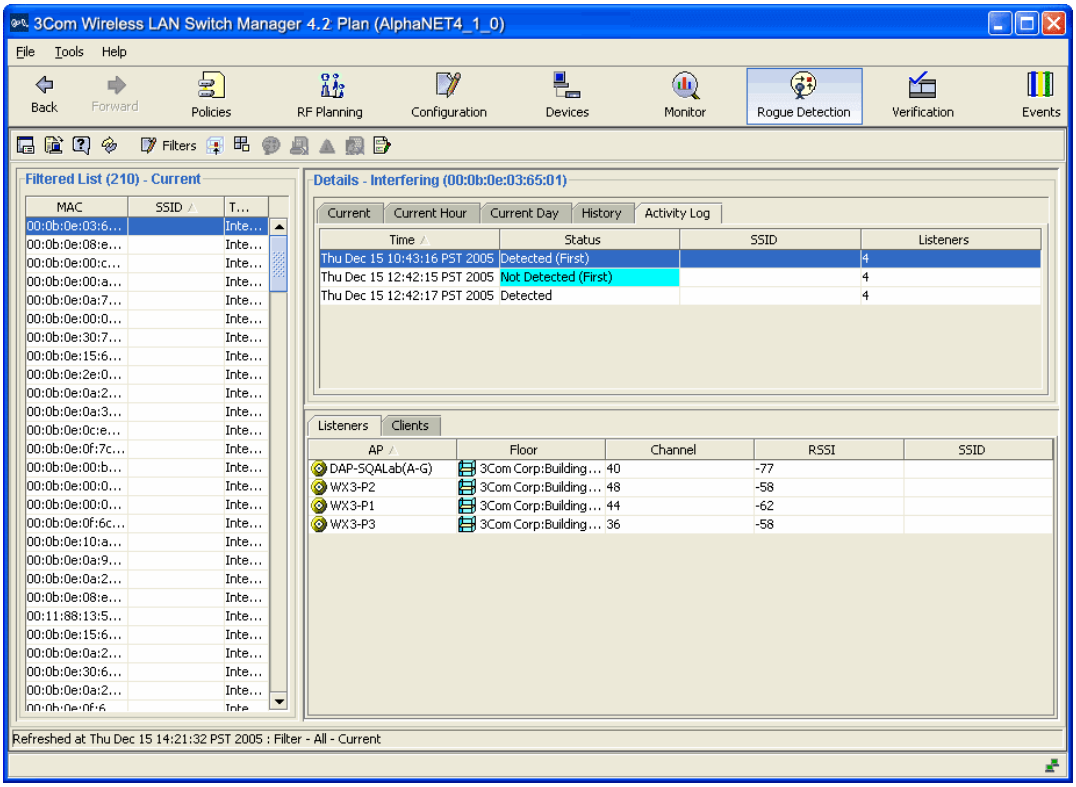
To locate a rogue

1 Click on the Rogue Detection option in the main 3WXM tool bar. The current rogue list is displayed.


3Com Wireless LAN Switch Manager 4.2 Plan (AlphaNET4_1_0)
File Tools Help
Back Forward Policies RF Planning Configuration Devices Monitor Rogue Detection Verification Events
Filters
Filtered List (210) - Current
MAC SSID T...
Details - Interfering (00:0b:0e:03:65:01)
Current Current Hour Current Day History Activity Log
Time Status SSID Listeners
Thu Dec 15 10:43:16 PST 2005 Detected (First) 4
Thu Dec 15 12:42:15 PST 2005 Not Detected (First) 4
Thu Dec 15 12:42:17 PST 2005 Detected 4
Listeners Clients
AP Floor Channel RSSI SSID
DAP-SQALab(A-G) 3Com Corp:Building... 40 -77
WX3-P2 3Com Corp:Building... 48 -58
WX3-P1 3Com Corp:Building... 44 -62
WX3-P3 3Com Corp:Building... 36 -58
Refreshed at Thu Dec 15 14:21:32 PST 2005 : Filter - All - Current

2 View statistics on a single rogue. Select a rogue from the Filtered List, then select the **Activity Log** tab.

The number of listeners (other MAPs) that detected the rogue are displayed. The larger the number of listeners detecting the rogue, the easier it is for 3WXM to locate the rogue in the RF coverage area.

Under Status, the first detected event and the first "not detected" event are displayed.

3 Locate the device in the RF coverage area. Select a rogue from the Filtered List and click the (Locate) icon on the toolbar.

The approximate location of the rogue is displayed in the RF coverage area.

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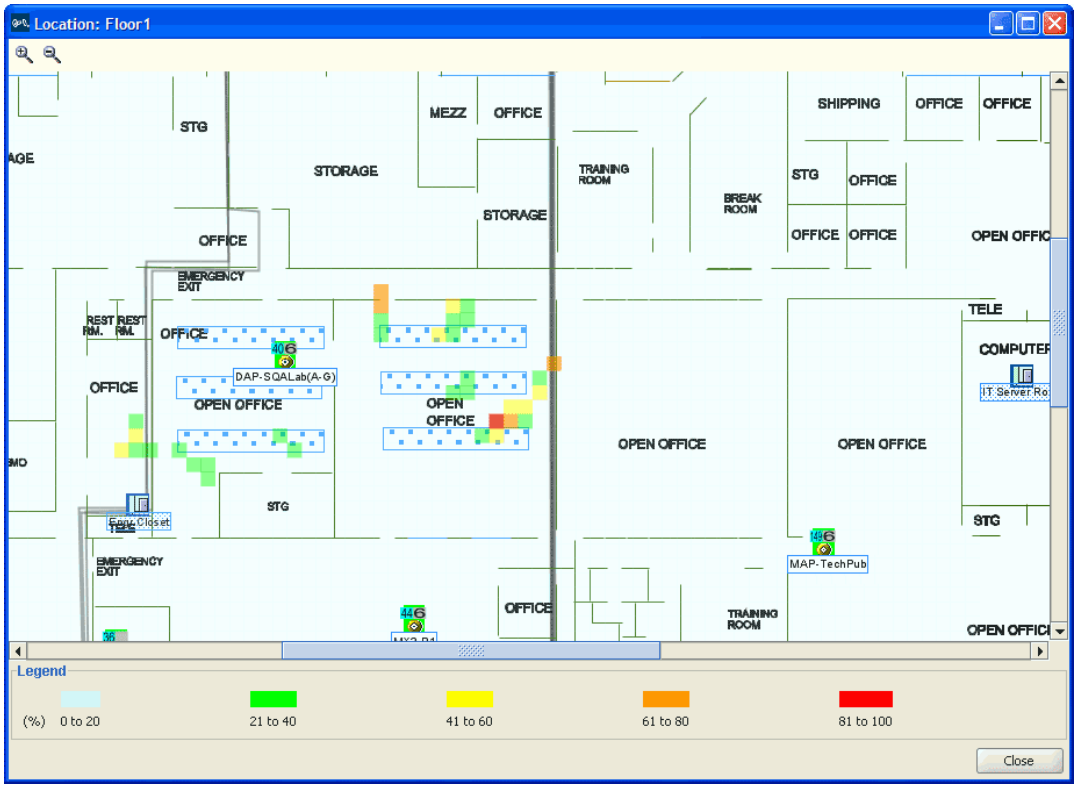

Configuring Countermeasures

You can enable MSS to use countermeasures against rogues. Countermeasures consist of packets that interfere with a client's ability to use the rogue. Countermeasures are disabled by default. When you enable them, all devices of interest that are not in the known devices list become viable targets for countermeasures.

Countermeasures are enabled on an individual radio profile basis. When you create a radio profile, you can apply it to specified service profiles or to individual radios. The following example shows how to create a radio profile, apply the radio profile to MAP radios, then enable countermeasures in the radio profile.

To enable countermeasures

1. Click on the Configuration option in the main 3WXM tool bar.
2. In the Organizer panel, click the plus sign next to the WX switch.
3. Click the plus sign next to Wireless.

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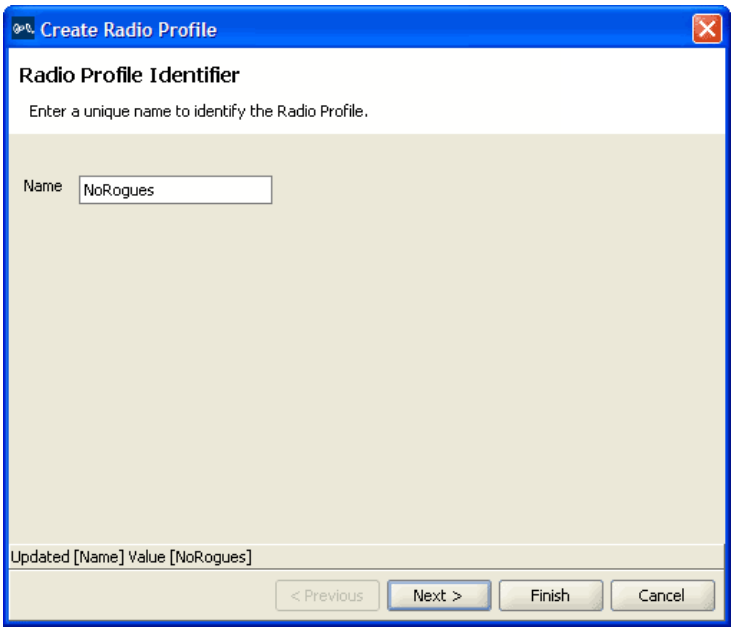
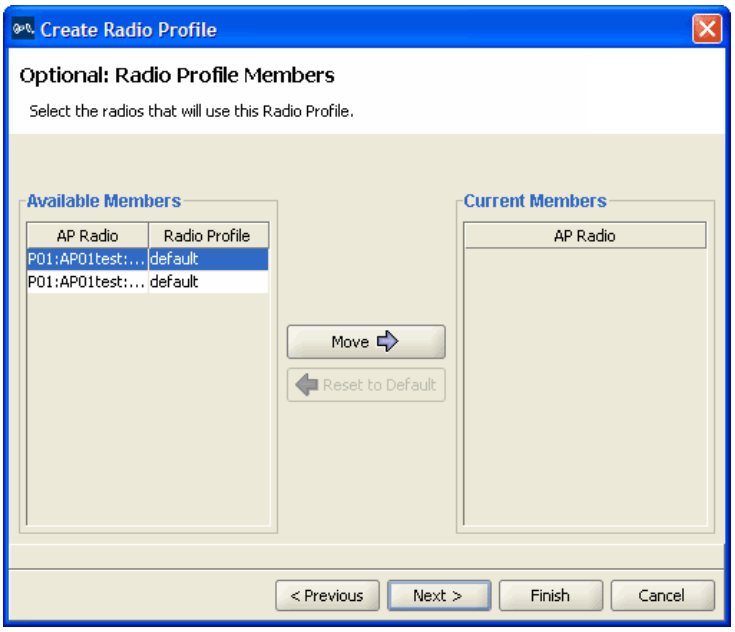
4 Select **Radio Profiles**.

5 In the Task List panel, click on **Create Radio Profile**. The Create Radio Profile wizard appears.



6 In the Name box, type the name of the radio profile (1 to 16 characters, with no spaces or tabs), and click **Next**. The Radio Profile Members page appears.



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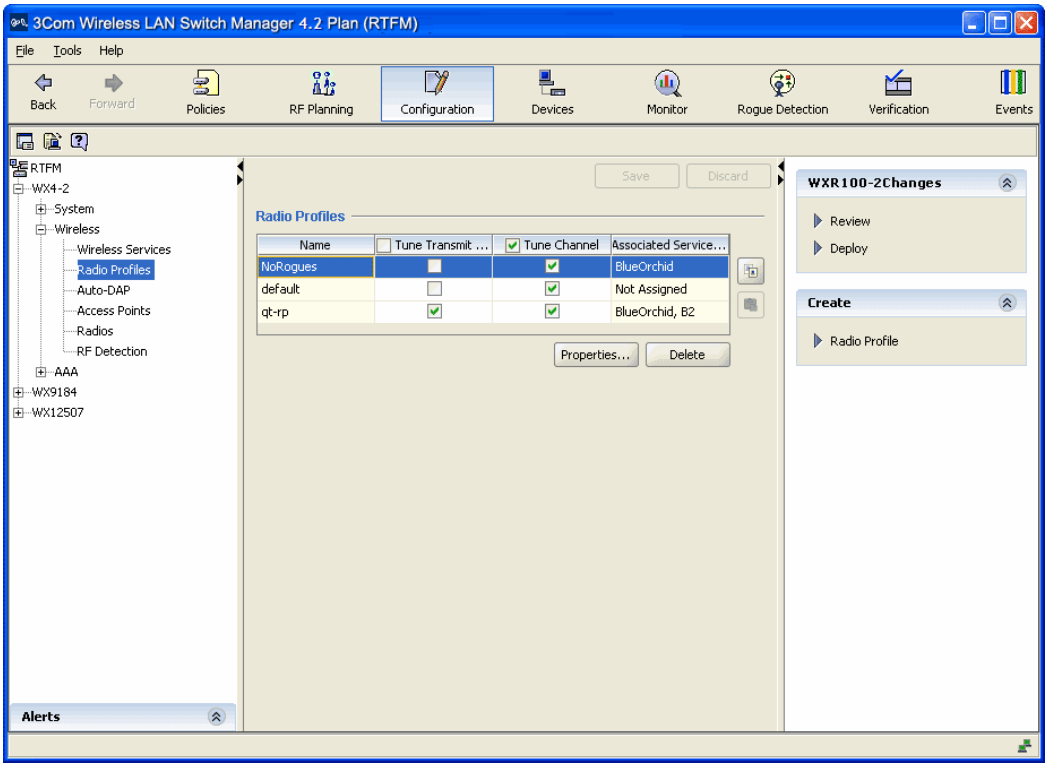
7 Select the MAP radios on which you want to enable countermeasures from the Available Members column, and click **Move** to move the radios to the Current Members column.

8 Click **Next**. The Radio Profile Service Selection page appears.

9 To map the radio profile to a service profile, select the service profile in the Available Service Profiles list and click **Add**.

10 Click **Finish**. The new radio profile appears in the Radio Profiles table in the Content panel.



11 Select the radio profile you created and click the properties button. The Radio Profile Properties dialog box is displayed.

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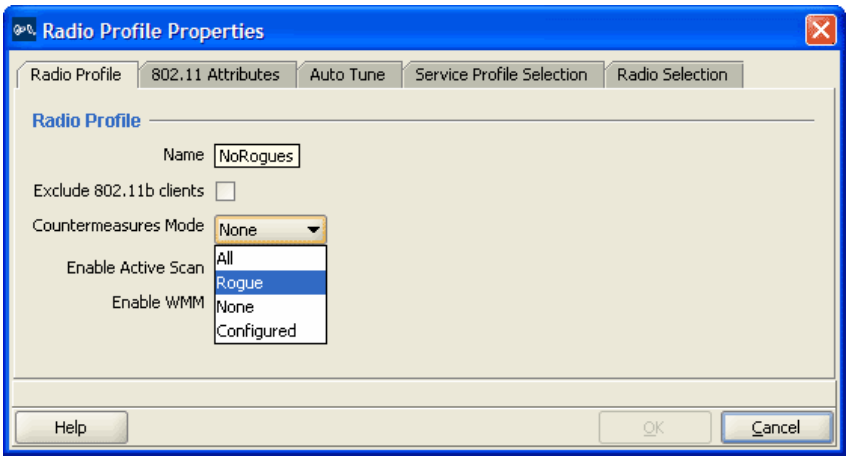

12 To enable countermeasures against rogues detected by radios managed by this profile, select one of the following from the Countermeasures Mode pull-down list:

- None—Radios do not use countermeasures. This is the default.
- All—Radios use countermeasures against devices classified by MSS as rogues and against devices classified by MSS as interfering devices.

A rogue is a device that is in the 3Com network but does not belong there. An interfering device is not part of the 3Com network but also is not a rogue. MSS classifies a device as an interfering device if no client connected to the device has been detected communicating with any network entity listed in the forwarding database (FDB) of any WX switch in the Mobility Domain. Although the interfering device is not connected to your network, the device might be causing RF interference with MAP radios.

- Rogue—Radios use countermeasures against devices classified by MSS as rogues, but do not use countermeasures against devices classified by MSS as interfering devices.

CAUTION: *Countermeasures affect wireless service on a radio. When a MAP radio is sending countermeasures, the radio is disabled for use by network traffic, until the radio finishes sending the countermeasures.*

- Configured—Causes radios to attack only devices specified in the attack list on the WX switch (on-demand countermeasures). When this option is used, devices found to be rogues by other means, such as policy violations or by determining that the device is providing connectivity to the wired network, are not attacked.

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13 To disable active scanning for rogue devices, deselect Enable Active Scan.

When active scan is enabled, radios send *probe any* requests (probe requests with a null SSID name), to solicit probe responses from other access points. Radios also passively scan by listening for beacons and probe responses. When active scan is disabled, radios perform passive scanning only.

14 Click **Finish** to save the changes and close the wizard.

To verify that countermeasures are being taken against the rogue

1 Click on the Rogue Detection option in the main 3WXM tool bar.

2 Select a rogue from the Filtered List and click the **Activity Log** tab.

3 The **Status** column will show countermeasure activity.

If countermeasures start, stop, and start again, the rogue may have left the area, then returned, or another MAP in the coverage area may have taken over countermeasure activities from the last MAP to detect the rogue.

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8 Optimizing a Network Plan

Optimizing your network is a post-deployment technique. You can optimize your WLAN by importing RF measurement data to correct RF attenuation obstacle information in your network plan. You optimize your network plan because:

- You have a reported coverage problem in your network
- You want to verify your network RF coverage

The RF measurement data you use to optimize your network plan can originate from:

- MAPs in your network. You can leverage the RF measurements derived from your MAPs. If you choose to use RF measurement data from the MAPs in your network, the data is determined against a smaller set of RF measurements.
- An Ekahau Site Survey™ tool. You perform a site survey of your network. The benefit of using RF measurements derived from a site survey is that the results more closely match the coverage environment that your wireless users experience in your network. Thousands of measurements can be recorded, creating a set of RF measurements that are more precise than those gained from your deployed MAPs.
- Both MAPs and a site survey.

By importing data and applying it to your network plan, you correct the RF model to reflect what the measurements report. You update the RF attenuation for obstacles based on real-world measurements. You can then replan your network to:

- Make changes in the software to improve signal strength and coverage for groups or individuals
- Modify MAP locations
- Add additional equipment to your network

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The following sections describe how to import RF measurements from your network, or how to import RF measurements from an Ekahau site survey.

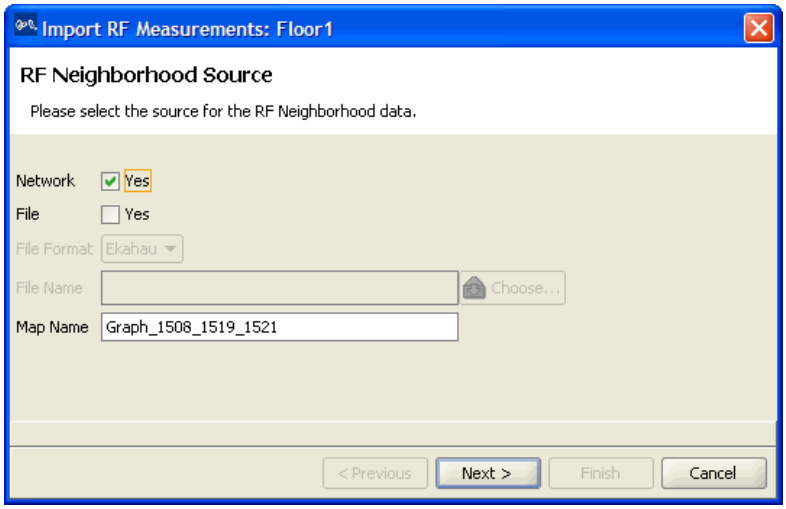
Using RF Measurements from MAPs

You can apply the RF measurements derived from the MAPs in your WLAN (which regularly monitors the RF environment) to your network plan. The RF measurements are taken from MAP radios.

After you apply the RF measurements, the floor's RF model (obstacles) will be optimized with this data.

To import RF measurements from MAPs

1. Select the RF Planning option in the main 3WXM tool bar.
2. Display the floor plan in the Content panel.
3. In the Task List panel, click **RF Planning**.
4. Under Site Survey, click **Import Measurement**. The Import RF Measurements wizard is displayed.



5. Select **Yes** next to Network.
6. Click **Next**.

The import progress is displayed. When the import is done, click **Finish** to accept the changes and close the wizard.

After you apply the network RF measurements, you correct the attenuation factors for the floor. Go to "Optimizing the RF Coverage Model" on page 187 for information about this topic.

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Using RF Measurements from an Ekahau Site Survey

RF measurements come from a site survey file generated by the Ekahau Site Survey tool. To perform a site survey:

- In 3WXM—View your RF coverage area.
- In 3WXM—Generate a site survey work order, specifying the area you want to survey. A JPEG (.jpeg, .jpg) file is generated.
- Import the generated JPEG file into the Ekahau Site Survey tool.
- Set the scale of the drawing.
- Perform the site survey. Walk through the area, taking measurements with the tool.
- Save the RF measurements in the Ekahau Site Survey tool to a file in comma-separated values (csv) format.
- In 3WXM—Import the csv file containing the RF measurements into 3WXM.
- In 3WXM—Optimize to correct attenuation factors.

The chapter guides you through the tasks you need to do in 3WXM. For information about tasks you need to do in the Ekahau Site Survey tool, please refer to the ESS tool's documentation.

The site survey example in this chapter is based on the RF coverage area that follows. For information about displaying RF coverage areas, see "Displaying the RF Coverage Area" on page 189.

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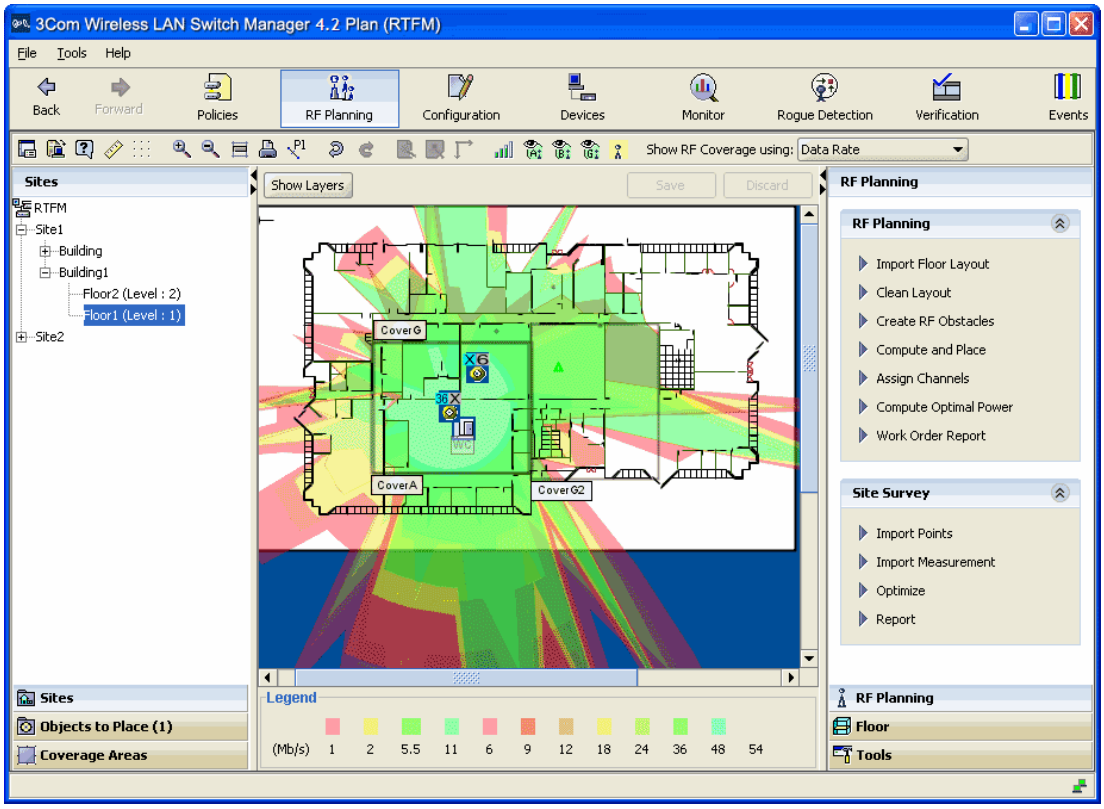

Generating an Ekahau Site Survey Work Order

The site survey order contains the locations and MAC addresses of the MAPs for use when conducting a site survey, and also provides a JPEG image of the floor.

To generate a site survey order

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **RF Planning**.
3. Under Site Survey, click **Report**. The Site Survey Order Generation dialog is displayed.

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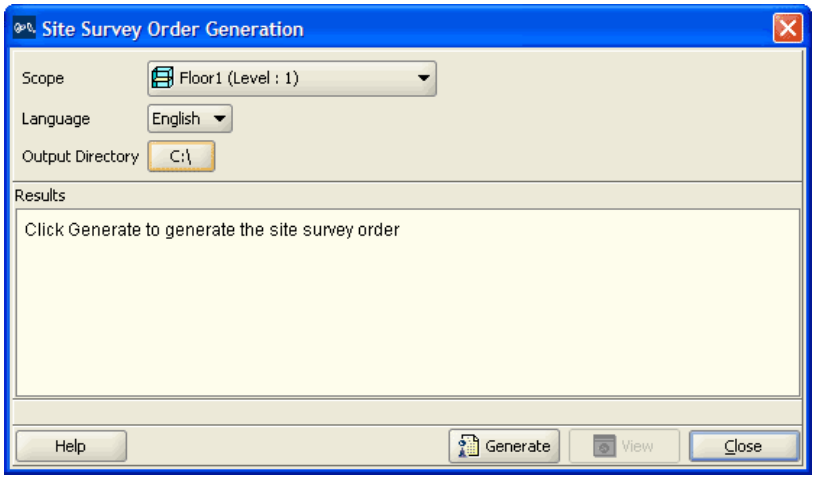

4 Select the scope for which you want generate a site survey order. You can specify the Network Plan, an individual site, an individual building, or an individual floor.

5 Select the language: English or German

6 To change the output directory for the report, click on the button next to output directory, navigate to the new directory, and click **Select**.

7 Click **Generate**.

8 When the report is generated, click **View**.

A browser window containing the report opens.

9 Click **View Site Survey Order** to view the site survey work order.

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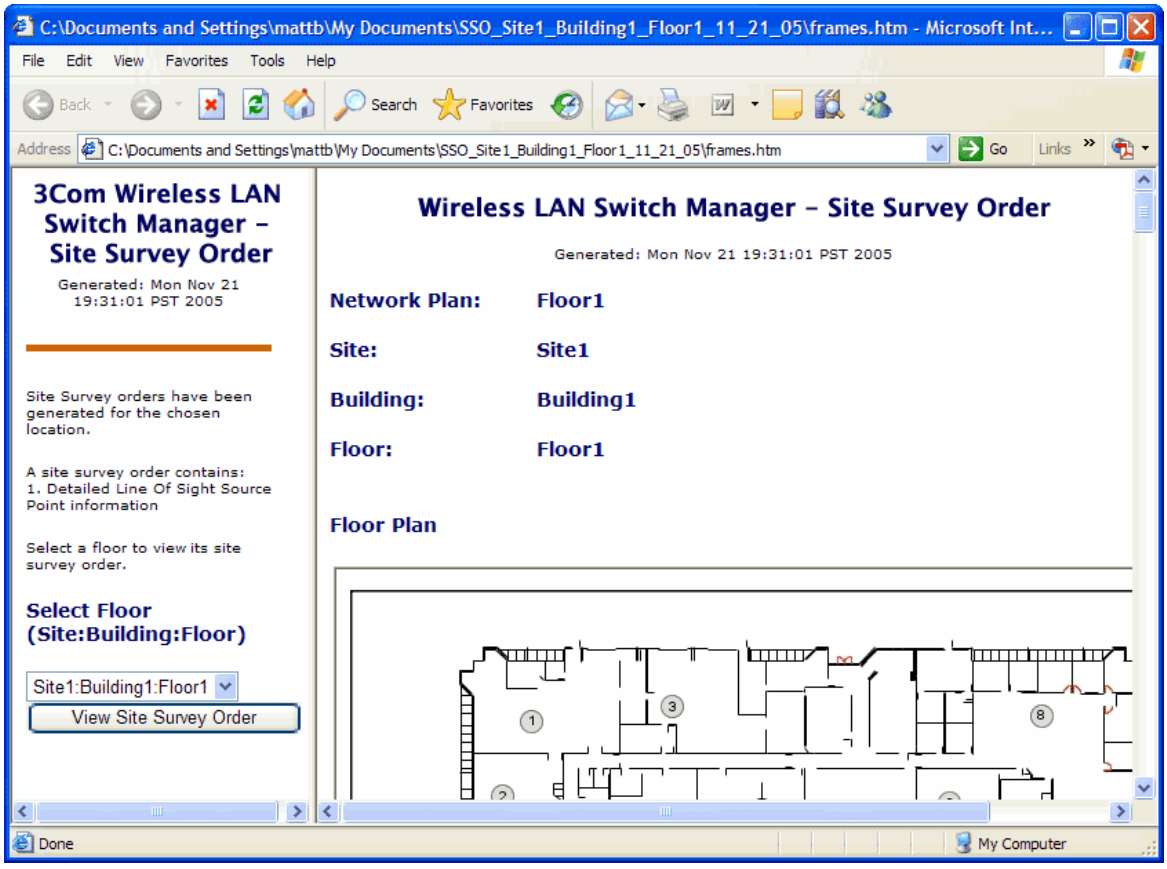
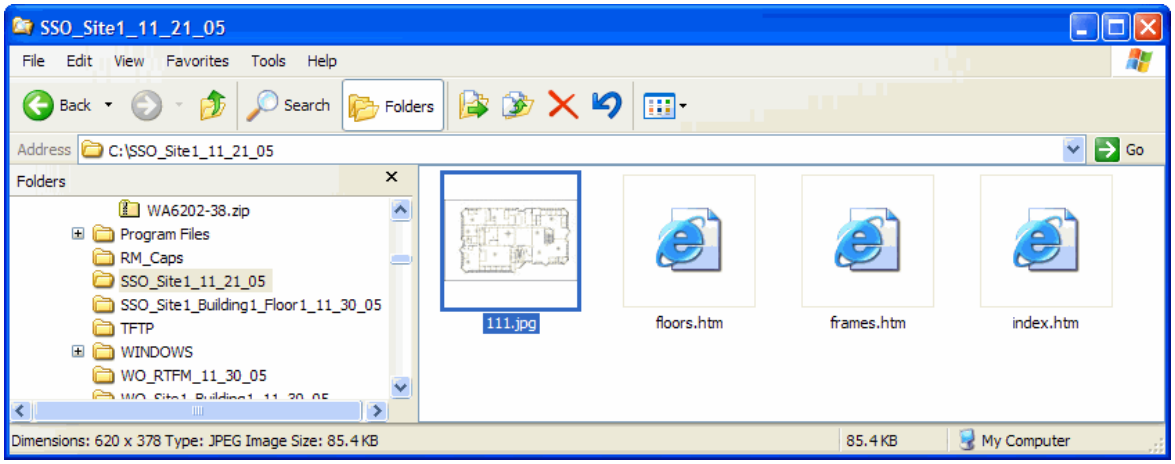

C:\Documents and Settings\mattb\My Documents\SSO_Site1_Building1_Floor1_11_21_05\frames.htm - Microsoft Int...
File Edit View Favorites Tools Help
Back Search Favorites
Address C:\Documents and Settings\mattb\My Documents\SSO_Site1_Building1_Floor1_11_21_05\frames.htm
Go Links
3Com Wireless LAN Switch Manager – Site Survey Order
Generated: Mon Nov 21 19:31:01 PST 2005
Site Survey orders have been generated for the chosen location.
A site survey order contains:
1. Detailed Line Of Sight Source Point information
Select a floor to view its site survey order.
Select Floor (Site:Building:Floor)
Site1:Building1:Floor1
View Site Survey Order
Wireless LAN Switch Manager – Site Survey Order
Generated: Mon Nov 21 19:31:01 PST 2005
Network Plan: Floor1
Site: Site1
Building: Building1
Floor: Floor1
Floor Plan
Done
My Computer

10 Browse to the output directory and locate the JPEG file. Copy this file and import it into your Ekahau Site Survey tool. Proceed with your site survey.



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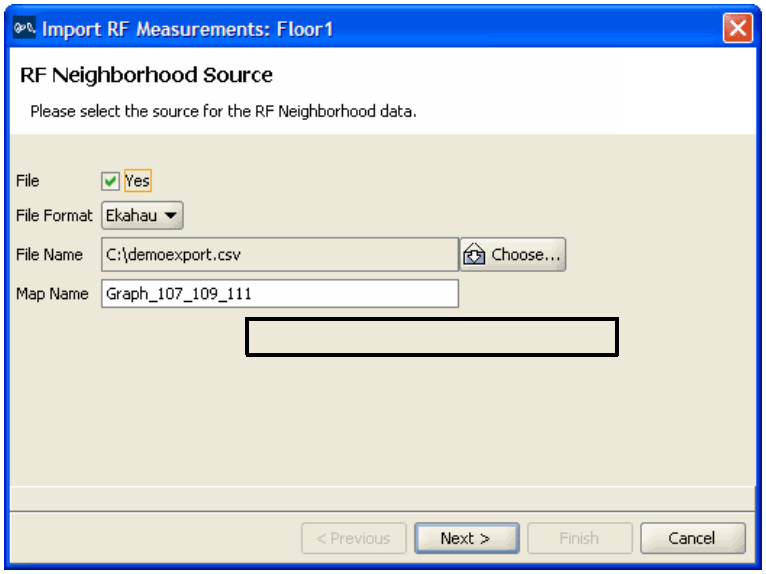
Importing RF Measurements from the Ekahau Site Survey

After you complete the site survey, you import the csv file containing the RF measurements from the Ekahau Site Survey tool into your network plan. After you import your RF measurements, you optimize to correct attenuation for obstacles on the floor.

To import RF measurements

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **RF Planning**.
3. Under Site Survey, click **Import Measurement**. The Import RF Measurements wizard is displayed.
4. Select **File** as the source of the measurements (or, you can select both **Network** and **File**).
5. Select **Ekahau** from the **File Format** listbox.
6. Click **Choose** to navigate to the csv file that contains the RF measurement data.
7. In the Map Name field, verify the map name.



The map name in the RF Neighborhood Source window must match the map name in the top line of the .csv file from the Ekahau Site Survey tool.

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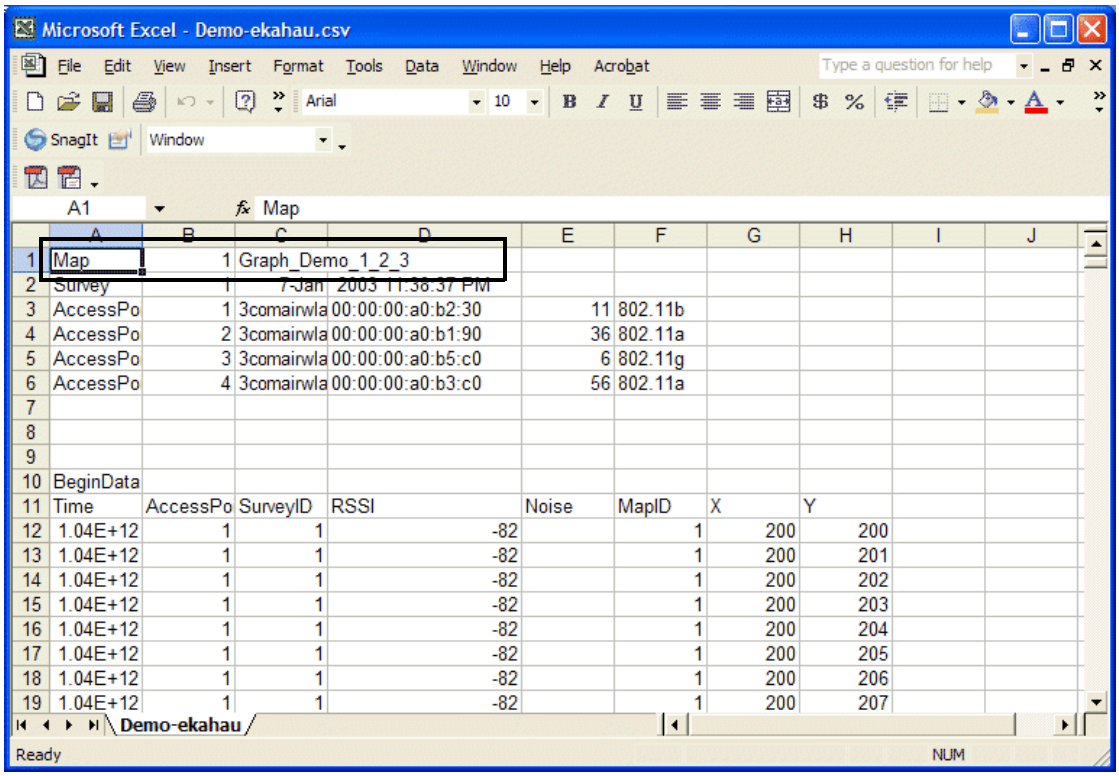

	A	B	C	D	E	F	G	H	I	J
1	Map	1	Graph_Demo_1_2_3							
2	Survey	1	7-Jan	2003 11:38:37 PM						
3	AccessPo	1	3comairwla	00:00:00:a0:b2:30	11	802.11b				
4	AccessPo	2	3comairwla	00:00:00:a0:b1:90	36	802.11a				
5	AccessPo	3	3comairwla	00:00:00:a0:b5:c0	6	802.11g				
6	AccessPo	4	3comairwla	00:00:00:a0:b3:c0	56	802.11a				
7										
8										
9										
10	BeginData									
11	Time	AccessPo	SurveyID	RSSI	Noise	MapID	X	Y		
12	1.04E+12	1	1	-82		1	200	200		
13	1.04E+12	1	1	-82		1	200	201		
14	1.04E+12	1	1	-82		1	200	202		
15	1.04E+12	1	1	-82		1	200	203		
16	1.04E+12	1	1	-82		1	200	204		
17	1.04E+12	1	1	-82		1	200	205		
18	1.04E+12	1	1	-82		1	200	206		
19	1.04E+12	1	1	-82		1	200	207		

8 Click **Next**.

The import progress is displayed. When the import is done, check the *Total valid RF measurements found* line in the progress messages.

- If the number is greater than 0, 3WXM successfully imported measurements.
- If the number is 0, no measurements were imported. Try the import again. If you are using a site survey file, verify that the map name is correct.

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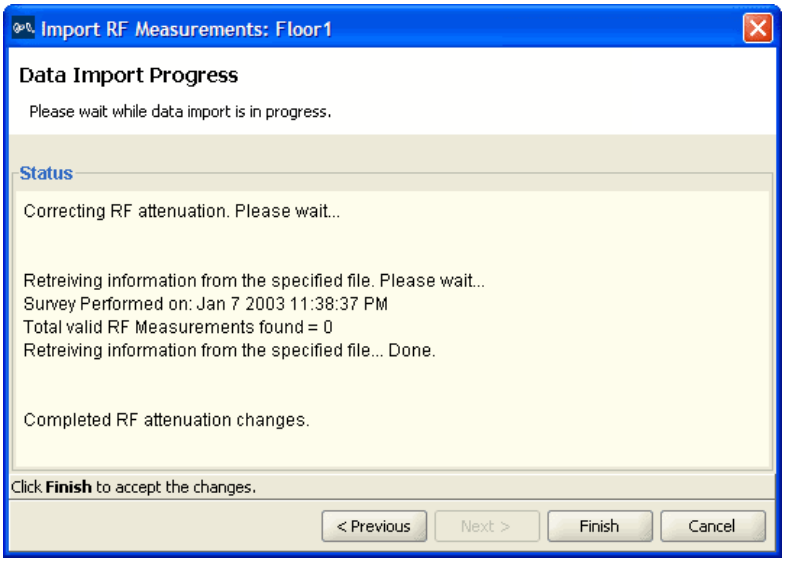
Import RF Measurements: Floor1
Data Import Progress
Please wait while data import is in progress.
Status
Correcting RF attenuation. Please wait...
Retreiving information from the specified file. Please wait...
Survey Performed on: Jan 7 2003 11:38:37 PM
Total valid RF Measurements found = 0
Retreiving information from the specified file... Done.
Completed RF attenuation changes.
Click Finish to accept the changes.
< Previous
Next >
Finish
Cancel

After you import your RF measurements, you correct the attenuation factors for the floor. Go to "Optimizing the RF Coverage Model" next for information about this topic.

Optimizing the RF Coverage Model

An attenuation library is a set of attenuation values for the RF obstacles on a floor. After you import RF measurements from a site survey or apply them from the RF measurements in your network to your network plan, you rebuild a floor's attenuation library using those RF measurements.

1. Display the floor plan in the Content panel.
2. In the Task List panel, click **RF Planning**.
3. Under Site Survey in the Task List panel, click **Optimize**.

   A wizard appears, listing the progress of the request.

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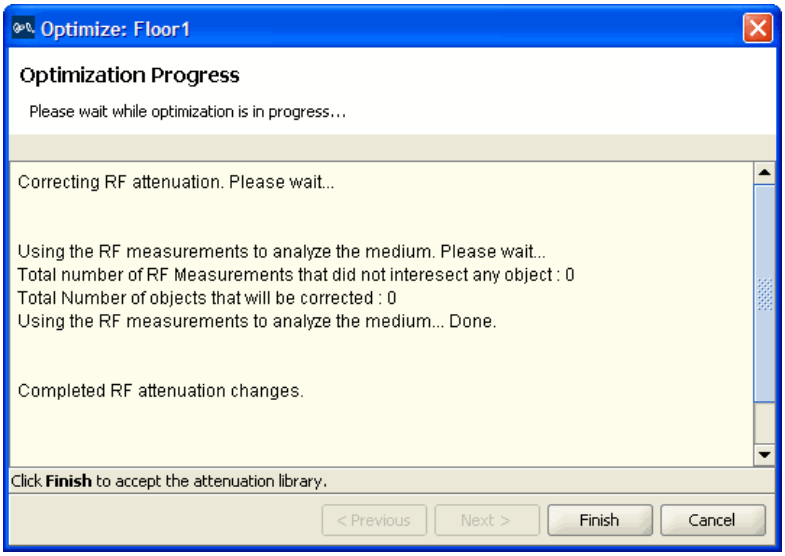
Optimize: Floor1
Optimization Progress
Please wait while optimization is in progress...
Correcting RF attenuation. Please wait...
Using the RF measurements to analyze the medium. Please wait...
Total number of RF Measurements that did not interesect any object : 0
Total Number of objects that will be corrected : 0
Using the RF measurements to analyze the medium... Done.
Completed RF attenuation changes.
Click Finish to accept the attenuation library.
< Previous
Next >
Finish
Cancel

- The *Total number of RF measurements that did not intersect any object* line lists the number of measurements that did not experience attenuation due to an RF obstacle in the path between them.

  If the measurements came from a site survey file, they are measurements between the deployed MAPs and the Ekahau Site Survey tool performing the survey. If the measurements came from MAP radios in the network, they are measurements between MAP radios.

- The *Total number of objects that will be corrected* line indicates the number of measurements that did experience attenuation. For existing RF objects, 3WXM corrects the attenuation to match the results. If the floor plan does not have an RF obstacle where the attenuation library indicates one exists, 3WXM creates an RF obstacle.

  For RF obstacles created by 3WXM, the description is **auto-generated** and the obstacle type is **Other**. You can edit these values by selecting the obstacle, clicking the Edit properties icon to open the Modify RF Obstacle wizard, and modifying the values. Click **Finish** to close the wizard and save the changes.

4 Click **Finish**.

You have optimized your RF coverage model with the new RF obstacle information. Now you can locate and fix coverage holes, or if necessary, replan your network.

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Locating and Fixing Coverage Holes

After you import RF measurements and rebuild the attenuation library, you can look for coverage holes by displaying coverage. To locate coverage holes:

- Display the optimized RF coverage area to view the results of the corrected attenuation data.
- Lock down deployed MAPs in the coverage area (so that 3WXM will not move MAPs in your network plan during the compute and place process).
- Compute and place MAPs.
- Replan your network based on compute and place results.

Displaying the RF Coverage Area

Display the RF coverage area to view the RF coverage based on the corrected attenuation data.

To display the RF coverage area

1. Select the RF Planning option in the main 3WXM tool bar.
2. Display the floor plan in the Content panel.
3. In the Task List panel, click **RF Planning**.
4. In the Show RF coverage using listbox, select how you want to display the coverage:
   - Baseline Association Rate—Coverage is shown based on the MAP radio baseline association rate. The baseline association rate is the typical data rate the radio is expected to support for client associations. (The baseline association rate is specified during planning, on a coverage area basis.)
   - Data Rate—Coverage is shown in colored bands that represent each of the data transmit rates supported by the radio. These rates are standard for each radio type.
   - RSSI—Coverage is shown based on the received signal strength indication (RSSI) of the radio's signal heard by other radios.
5. In the Coverage Areas section of the Organizer panel, select the scope for which you want to display coverage. You can display coverage for an individual radio, a specific coverage area, or all coverage areas on the floor.
   - To select multiple contiguous objects, click **Shift** while selecting.
   - To select multiple noncontiguous objects, click **Ctrl** while selecting.

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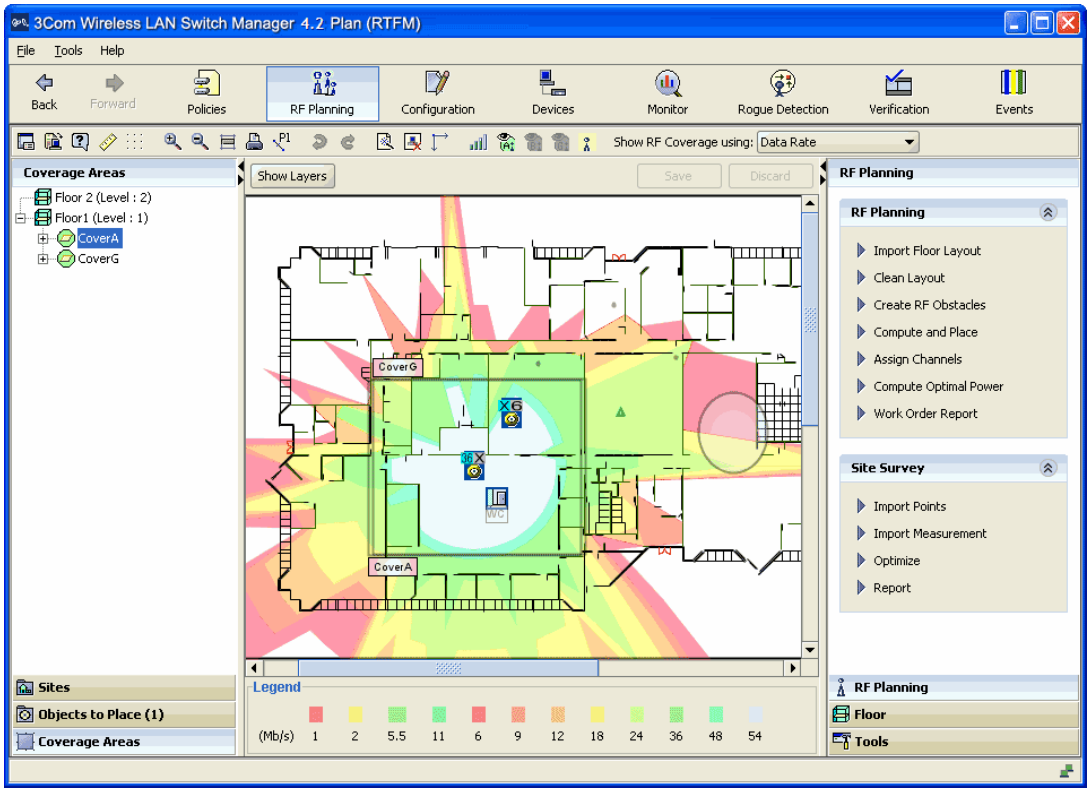
6 On the toolbar, click the radio type (A, B, or G) for which you want to display coverage.

Coverage for the selected scope(s) is displayed. This example shows 802.11a coverage, by transmit data rate, for the coverage area CoverA.



Locking Down MAPs

To prevent 3WXM from moving a MAP on your network plan that you do not want to be redistributed, lock the MAP down.

To lock down a MAP

1 Display the RF coverage area.

For information about how to display the RF coverage area, see "Displaying the RF Coverage Area" on page 189.

2 Right-click on a MAP in the RF coverage area, and select Lock.

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Fixing a Coverage Hole

After you import RF measurements, rebuild the attenuation library, and display coverage, you can observe any wireless coverage holes in the network. To fix a coverage hole, use either of the following methods:

- Lock the MAPs in place, and use the Compute and Place task to recompute the number of MAPs needed and their recommended placement. If this results in new MAPs being added, install the new MAPs.
- Install new MAPs and add them to the network plan. Using this method, you install the new MAP first, then integrate it into your network plan.

Computing and Placing New MAPs

The procedure for computing and placing new MAPs is the same as the procedure you use for initial planning. (See "Compute and Place MAPs" on page 144.) Using this procedure, you can determine the number and location of additional MAPs you should add to your network.

Replanning Your Network

After you have computed and placed new MAPs in the network plan, you will need to add the MAPs to your network. For information about adding MAPs to your network, see the *Wireless LAN Switch and Controller Hardware Installation Guide*. This guide contains instructions and specifications for installing an MAP access point and connecting it to a WX switch.

After you install a new MAP in the network and you want to add it to the network plan, do the following:

1. Select the RF Planning tool bar option.
2. In the Content panel, display the floor plan where the MAP is to be installed.
3. In the Organizer panel, click on **Coverage Areas**.
4. Right-click the Coverage Area to which the MAP is to be associated, and select Edit Properties from the menu. The Coverage Area Properties dialog for the selected coverage area appears.
5. Click the **Associations** tab to display area associations information for the coverage area.
6. In the Available Access Points box, select one or more available MAPs to use in the coverage area, then click **Add** to move the MAPs to the Current Access Points box.
7. Click **OK** to close the dialog box.

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8 In the Organizer panel, click on **Objects to Place**. A list of the MAPs you created is displayed in the panel.

9 Click on the MAP icon, then click on the location where you installed the MAP. The MAP icon moves from the Objects To Place panel to its location on the floor.

What's Next?

You can create a backup copy of your updated network plan, and distribute the 3WXM configuration to other WX switches.

For information about administrative tasks, see "Perform Basic Administrative Tasks" on page 157.

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A Obtaining Support for Your 3Com Products

3Com offers product registration, case management, and repair services through eSupport.3com.com. You must have a user name and password to access these services, which are described in this appendix.

Register Your Product to Gain Service Benefits

To take advantage of warranty and other service benefits, you must first register your product at:

http://eSupport.3com.com/

3Com eSupport services are based on accounts that are created or that you are authorized to access.

Solve Problems Online

3Com offers the following support tool:

- **3Com Knowledgebase —** Helps you to troubleshoot 3Com products. This query-based interactive tool is located at:

  http://knowledgebase.3com.com

  It contains thousands of technical solutions written by 3Com support engineers.

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Purchase Extended Warranty and Professional Services

To enhance response times or extend your warranty benefits, you can purchase value-added services such as 24x7 telephone technical support, software upgrades, onsite assistance, or advanced hardware replacement.

Experienced engineers are available to manage your installation with minimal disruption to your network. Expert assessment and implementation services are offered to fill resource gaps and ensure the success of your networking projects. For more information on 3Com Extended Warranty and Professional Services, see:

http://www.3com.com/

Contact your authorized 3Com reseller or 3Com for additional product and support information. See the table of access numbers later in this appendix.

Access Software Downloads

You are entitled to *bug fix / maintenance releases* for the version of software that you initially purchased with your 3Com product. To obtain access to this software, you need to register your product and then use the Serial Number as your login. Restricted Software is available at:

http://eSupport.3com.com/

To obtain software releases that *follow* the software version that you originally purchased, 3Com recommends that you buy an Express or Guardian contract, a Software Upgrades contract, or an equivalent support contract from 3Com or your reseller. Support contracts that include software upgrades cover feature enhancements, incremental functionality, and bug fixes, but they do not include software that is released by 3Com as a separately ordered product. Separately orderable software releases and licenses are listed in the 3Com Price List and are available for purchase from your 3Com reseller.

Contact Us

3Com offers telephone, internet, and e-mail access to technical support and repair services. To access these services for your region, use the appropriate telephone number, URL, or e-mail address from the table in the next section.

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Telephone Technical Support and Repair

To obtain telephone support as part of your warranty and other service benefits, you must first register your product at:

http://eSupport.3com.com/

When you contact 3Com for assistance, please have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision level
- Diagnostic error messages
- Details about recent configuration changes, if applicable

To send a product directly to 3Com for repair, you must first obtain a return materials authorization number (RMA). Products sent to 3Com without authorization numbers clearly marked on the outside of the package will be returned to the sender unopened, at the sender's expense. If your product is registered and under warranty, you can obtain an RMA number online at http://eSupport.3com.com/. First-time users must apply for a user name and password.

Telephone numbers are correct at the time of publication. Find a current directory of 3Com resources by region at:
http://csoweb4.3com.com/contactus/

Country	Telephone Number	Country	Telephone Number
Asia, Pacific Rim — Telephone Technical Support and Repair			
Australia	1800 075 316	Philippines	1800 144 10220 or 029003078
Hong Kong	2907 0456		
India	000 800 440 1193	PR of China	800 810 0504
Indonesia	001 803 852 9825	Singapore	800 616 1463
Japan	03 3507 5984	South. Korea	080 698 0880
Malaysia	1800 812 612	Taiwan	00801 444 318
New Zealand	0800 450 454	Thailand	001 800 441 2152

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Country	Telephone Number	Country	Telephone Number
Pakistan Call the U.S. direct by dialing 00 800 01001, then dialing 800 763 6780 Sri Lanka Call the U.S. direct by dialing 02 430 430, then dialing 800 763 6780 Vietnam Call the U.S. direct by dialing 1 201 0288, then dialing 800 763 6780			

You can also obtain non-urgent support in this region at this email address apr_technical_support@3com.com
Or request a return material authorization number (RMA) by FAX using this number: +61 2 9937 5048, or send an email at this email address: ap_rma_request@3com.com

Europe, Middle East, and Africa — Telephone Technical Support and Repair

From anywhere in these regions not listed below, call: +44 1442 435529

From the following countries, call the appropriate number:

Austria	0800 297 468	Luxembourg	800 23625
Belgium	0800 71429	Netherlands	0800 0227788
Denmark	800 17309	Norway	800 11376
Finland	0800 113153	Poland	00800 4411 357
France	0800 917959	Portugal	800 831416
Germany	0800 182 1502	South Africa	0800 995 014
Hungary	06800 12813	Spain	900 938 919
Ireland	1 800 553 117	Sweden	020 795 482
Israel	180 945 3794	Switzerland	0800 553 072
Italy	800 879489	U.K.	0800 096 3266

You can also obtain support in this region using this URL: http://emea.3com.com/support/email.html

You can also obtain non-urgent support in this region at these email addresses:
Technical support and general requests: customer_support@3com.com
Return material authorization: warranty_repair@3com.com
Contract requests: emea_contract@3com.com

Latin America — Telephone Technical Support and Repair

Antigua	1 800 988 2112	Guatemala	AT&T +800 998 2112
Argentina	0 810 444 3COM	Haiti	57 1 657 0888
Aruba	1 800 998 2112	Honduras	AT&T +800 998 2112
Bahamas	1 800 998 2112	Jamaica	1 800 998 2112
Barbados	1 800 998 2112	Martinique	571 657 0888
Belize	52 5 201 0010	Mexico	01 800 849CARE
Bermuda	1 800 998 2112	Nicaragua	AT&T +800 998 2112
Bonaire	1 800 998 2112	Panama	AT&T +800 998 2112
Brazil	0800 13 3COM	Paraguay	54 11 4894 1888
Cayman	1 800 998 2112	Peru	AT&T +800 998 2112
Chile	AT&T +800 998 2112	Puerto Rico	1 800 998 2112
Colombia	AT&T +800 998 2112	Salvador	AT&T +800 998 2112
Costa Rica	AT&T +800 998 2112	Trinidad and Tobago	1 800 998 2112
Curacao	1 800 998 2112	Uruguay	AT&T +800 998 2112
Ecuador	AT&T +800 998 2112	Venezuela	AT&T +800 998 2112
Dominican Republic	AT&T +800 998 2112	Virgin Islands	57 1 657 0888

You can also obtain support in this region in the following ways:

- Spanish speakers, enter the URL: http://lat.3com.com/lat/support/form.html
- Portuguese speakers, enter the URL: http://lat.3com.com/br/support/form.html
- English speakers in Latin America, send e-mail to: lat_support_anc@3com.com

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Country	Telephone Number	Country	Telephone Number
US and Canada — Telephone Technical Support and Repair			
All locations:	Network Jacks; Wired or Wireless Network Interface Cards:		1 847-262-0070
	All other 3Com products:		1 800 876 3266

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